NATURE MAGAZINE

AUGUST 1928 35¢ VOL. 12, NO. 2

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The American Nature Association seeks to find for Nature Study an essential place in every School and in every American Home. It is working for Forest and Wild Life Protection along sane, economic lines. It believes that clean, healthful Out-of-Door Recreation is the key to Good Citizenship

At the time of going to press with this issue of Nature Magazine the situation with respect to the menace to the Yosemite National Park from the prospect of timber cutting on private lands within the park remained unchanged. The appeal to Save the Yosemite in the July issue was met with hearty indications of willingness to serve. In response to a letter from our president, Arthur Newton Pack, giving the last minute details of the situation, the *New York Times* declared editorially:

"A new danger to the privately owned forests in the Yosemite National Park, unless prompt action is taken to acquire them for the Government, is indicated in a letter from Mr. Arthur N. Pack, President of the American Nature Association. The two lumber companies which had agreed not to operate in the park during the coming year have, it is now reported, given options to a third lumber company, which plans to begin cutting immediately. Unless this plan is checked the trees which it had been hoped would be saved will be felled and this section of the Yosemite Park ruined.

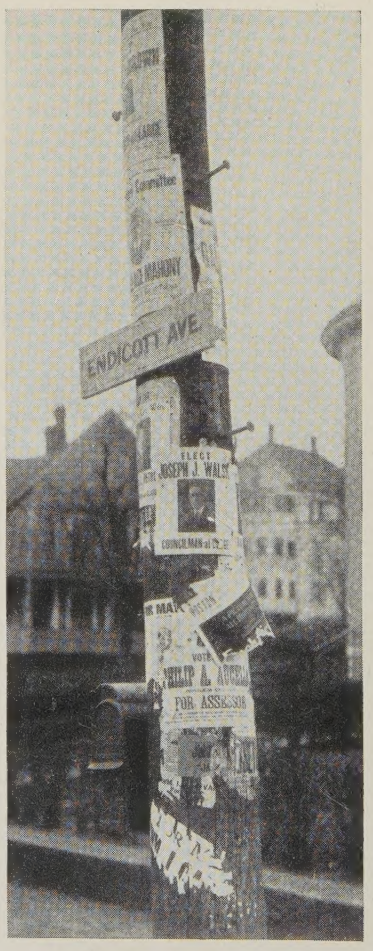
"Simultaneously with Mr. Pack's appeal comes an article from the pen of Mr. Robert Sterling Yard, Executive Secretary of the National Parks Association, and a formal statement by the Chief of the Bureau of Forestry in Washington, both relating to the Yosemite forests. Mr. Yard seeks to explain the history of the policies of Congress and the National Park Service toward the acquisition of privately owned lands within the national parks. Major Stuart, speaking for the Forestry Service, elaborates the obstacles in the way of effecting an exchange between the National Park Service and the National Forest Service of private and Government owned lands.

"Both are valuable contributions to the discussion of what has been done in the past about the Yosemite forests. Neither does much to stress the need of immediate action if the trees are to be saved. Major Stuart remarks that the Forest Service will welcome placing all the facts before Congress. Mr. Yard suggests that the Forest Service might be induced to change its present policy, which prevents an exchange of lands. But, as Mr. Pack intimates in his letter, the matter may go by default unless prompt action is taken.

"Already the people of California, heeding a nation-wide demand that the Yosemite forests be saved, are endeavoring to do their bit to help. The Sierra Club, which contains among its members many of the leading men of the State, not only is taking the lead in the fight, but is in communication with the Secretary of Agriculture in the hope of inducing him to alter the policy of the Forestry Bureau so as to facilitate an exchange of lands between the two Government services. Unfortunately, the Forestry Bureau is torn between its desire to save the nation's forests and the demands of the local communities to produce revenues for schools and roads. So strong is the political pressure that it hesitates to withdraw lands which, if lumbered, would yield an income of which a quarter would be paid to the county authorities. This has brought upon the Forestry Service the charge that it is more interested in making money than in saving trees—a charge which is freely repeated even in California, where the people until recently have been so thoughtless about conservation.

"So long as the Forest Service and the Park Service cannot make a satisfactory arrangement to trade Government lands for the privately owned lands within the Yosemite, there is only one thing to do—to acquire these lands for the Government."

Political Outdoor Bad Manners as exhibited in Revere, Mass., and which aroused the local Chamber of Commerce to a successful fight against such abuses.



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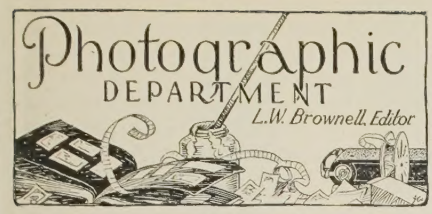
The photograph on this page calls attention again to the Nature Magazine Outdoor Good Manners Campaign that is continuously being carried on. Local civic organizations can well expend effort to check outdoor *bad* manners such as the picture illustrates. Individuals and organizations are invited to appeal to Nature Magazine for assistance and material to help in their local campaigns. We have prepared material for this as a matter of public service. Ask for it.



Is it possible to make photographs of birds and plants with an Eastman Pocket Kodak?—M. L. C.

Yes, this is possible especially if the kodak is fitted with one of the more rapid lenses. Of course to make pictures of wild birds with any kodak is difficult since one is rarely able to approach them close enough to permit of using a hand camera. Considerable may be done, however, with patience and the use of the portrait lens attachment which enlarges the subject and also permits one to work closer to the subject without having the image out of focus. With flower work it is well to use this attachment also. Of course if one's kodak is equipped with the combination back which allows the use of cut films and plates, it can be used on a tripod, focussed, and treated in exactly the same manner as any other tripod camera.

Cleaning Hardened Negatives

Mr. J. R. Risdon, of Binghamton, N. Y., has kindly sent me the following formula for cleaning plates that have been hardened. I have never tried it but he says that he has found it to be the cleanest, most harmless and most efficient method he has ever found for the purpose:

Water	16 ounces
Sodium Fluoride	2 drams
Sulphuric Acid	2 drams

Use at a temperature of about seventy degrees. After soaking negative in this solution for a few minutes the entire emulsion will come off intact. The quantity of solution given will clean a considerable batch of plates and has no effect on the fingers.

This is, of course, a very similar solution to that which is used for the stripping of negatives in order to transfer the film to some other support only, in the latter case, nitric and not sulphuric acid is used.

The Advantage of Panchromatic Plates, or Films

It has not been many years since the panchromatic plate has come into general use. Only a few years ago they were used almost exclusively by the photo-engraver who made three-color work. This was because when they were first put on the market they were slow and few photographers were familiar with the filters that were necessary to be used in order to secure color separation. Gradually, however, the speed of these plates has been increased until now they are rated as 20% above par speed or 40% above the speed of the Orthochromatic plate. This, of course, without the use of a filter.

Users of cameras have been afraid to try these plates because of the supposed great difficulty in developing them. In point of fact this difficulty is very slight. The only precaution necessary is the elimination of all red light from the dark room when handling them for, as they are extremely sensitive

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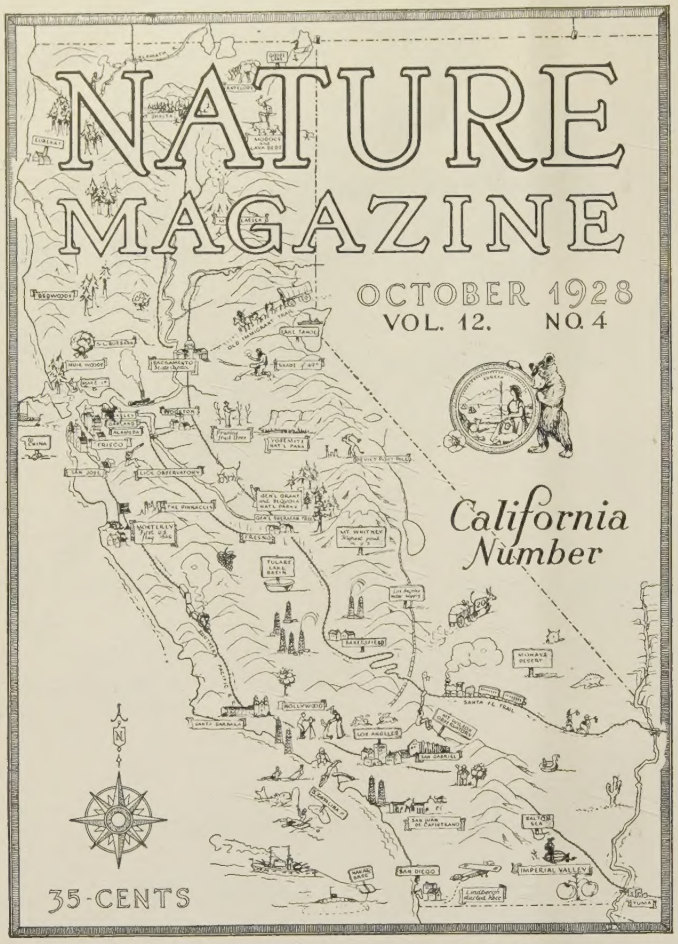

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to red any smallest amount of red light will cause them to fog. Holders must be loaded, unloaded, and the development of the plates done in total darkness or by the weak green light of the series 3 Safelight. I can hear some of my readers exclaim how can one work in the dark? In point of fact it is not nearly as difficult as it may seem. In loading one's plateholders one will soon discover that the sense of touch is all he really needs to do so with ease and, as these plates are always wrapped in pairs in the boxes, face to face, the danger of getting them in backwards is eliminated. In the development, if the exposure has been approximately correct, they should be given about five minutes in a normal developer at proper temperature to obtain a fully developed negative.

When one has used these plates for a short time and has become accustomed to their manipulation he will rarely use any others. The sensitiveness to reds and oranges, which in other plates, even the orthochromatics, photograph as black, make them invaluable, especially to the Nature photographer, for obtaining true color values in the negatives.

As to the filter necessary for obtaining the correct color rendering for general, all around work the only one necessary is the "K3". This will give approximately correct color values under nearly every condition that the average photographer is apt to encounter. With this filter the exposure speed must be increased 4½ times the speed given with the plate without the filter.

There are no other plates with which red or deep orange flowers, for instance, may be successfully photographed.

Anti-Rodeo Petition

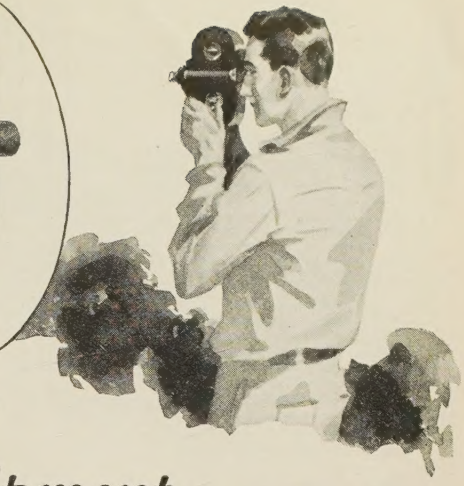
In an attempt to raise legal bars against rodeos because of alleged cruelties to horses and steers, the California Anti-Rodeo-Cruelty Association, from Berkeley, is circulating a petition to bring public attention to a focus. It already has the support of the National Congress of Parents and Teachers, and of humane societes over all the country, and has collected a formidable array of evidence to prove their case.

Nature Prizes

As a reward to those New York Public schools who built bird houses and made posters to aid preservation programs in Riverside Park, the Woman's League for the Protection of Riverside Park recently gave the Nature rooms of the schools subscriptions to Nature Magazine. Miss Evelyn Borchard of the Horace Mann School for Girls, who received the Gold Star for excellent work, was also a recipient. Junior High No. 165 led in the poster and bird house construction.

Preserve Park Flowers

The National Park Service has issued a call for individuals to help preserve the flowers in the parks, and refrain from lavishly picking them or pulling them up. Among the flowers which are in the greatest danger are beargrass flowers, the Indian paint brush, and the wild hollyhock, all of which grow near paths, hotels and camp sites.



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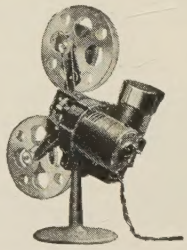

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Other lectures by Mr. Cleaves are:

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Readers of this column are urged to write to the Travel Editor for any information desired relative to travel, whether it is for short distances or long distances. To every inquirer will be sent, by return mail, some definite information and this will be followed by special literature regarding the places about which they desire information. This department is designed to be of direct personal service to the readers of this magazine.

The months of August and September are rarely considered by the average tourist as the proper time to take a trip abroad. In reality early fall is a particularly attractive season. By going at this time one avoids the rush of Americans who make the trip at the height of the summer season. Also the extremely hot weather is past, and both train and motor travel are more agreeable. The steamship rates are lower, since the summer season for east-bound sailings ends the early part of August with most companies, and after this the regular reductions are in effect. Reservations are more readily obtained, and in many cases the hotel rates

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are lower. Italy and the Mediterranean countries especially are far more pleasant at this time of the year than in the heat of the summer.

According to dispatches received from authorities of the various National Parks in the United States and Canada, cameras of all kinds are in great demand this summer. Travellers desiring to record the beauties of the scenery supply themselves with still cameras for panorama photos, while those particularly interested in obtaining pictures of wild life carry with them the popular movie cameras. Whether they are snapshots or reels of film the resultant records are to be highly valued. We recommend that in each party be at least one camera.

Looking ahead several months, we mention the fact that literature concerning winter cruises is already on hand. Clark's 25th Cruise to the Mediterranean will be on the new "Transylvania", leaving New York the end of January, and in 66 days visiting the outstanding Mediterranean points of interest, with 15 days in Palestine and Egypt, and time in Morocco and the Canary Islands. The same company is also sponsoring their Ninth Cruise Around the World, from New York on January 16th, travelling westward. Information and literature will be sent on request.

Another well-known steamship company has announced the dates for its annual Around the World Cruise. That of the Canadian Pacific Company leaves New York on December 1st, and returns on April 15th. This cruise sails first to the Mediterranean ports, then continues eastward by the Holy Land, India, the Orient, and back to New York through the Panama Canal. It is a delightfully planned trip of 4½ months, visiting unusual places all around the world. Write to this department for literature.

The fire pit in the crater of the Kilauea volcano, a leading feature of the Hawaiian National Park, has caused an increase in the number of tourists visiting the park in the past season, by giving out occasional fireworks. Some unusual eruptions cause the blackened lava generally seen on the floor of the pit to be replaced by fiery lava, and a bright red glow. There is little power in the display, and it rarely lasts through the night. Other notes from the same park tell of new road building projects both on the "Chain of Craters" Road, and the Around-the-Island Drive. For those interested in visiting the island during the fall or winter seasons, descriptive literature will be obtained.

Cruises on the St. Lawrence have become so popular that though several companies are now in operation, practically all ships are well filled on this route. The Clarke Steam-

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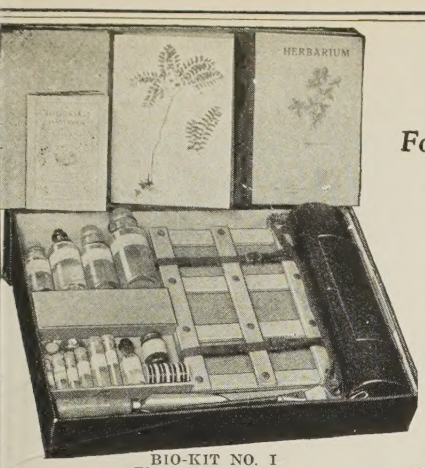

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ship Company's schedule for their vessels is arranged on an every-other-week plan up until the first of December. We have previously mentioned the beauties of the St. Lawrence and Saguenay Rivers, the fascination of Quebec, and the enjoyable climate. Now some of the cruises are laid out in such a way as to allow stopovers at Murray Bay and Tadousac, where one may golf, swim, ride, etc., and savor the appeal of these two delightful resorts.

Thos. Cook & Son have announced that airplane service will be operated for the convenience of the passengers on their 1929 World Cruise aboard the "Franconia". The cruise will start from New York the middle of January, and return the last of May. The airplane trips will include a hop from Moscow to Paris, and a trip to the hinterland of Arabia. On this latter trip camping outfits will be carried along, permitting the travellers to sleep in the desert under the wings of the planes. Many of the ports to be touched by the "Franconia" have never been visited by world cruisers, it is said.

The Hamburg-American Line calls to our attention the increase in the westward tide of tourist travel. This year there was a definite Spring tourist movement from Europe to America. In previous seasons such travel was participated in primarily by students and teachers who came in groups to see the United States during their vacation periods. Now the large numbers which arrive frequently from all parts of Europe include groups of professional and business men as well as the regular tourists.

The International Mercantile Marine Company has ordered a new vessel to be built for the Panama Pacific Line. This ship will be a sister ship of the electric liner "California", the largest commercial vessel ever built in an American yard, and now engaged in the coast to coast service of the Panama Pacific Line. The new vessel will be named the "Virginia", and should be ready to launch in December of this year. She will be followed shortly by a third liner to operate in the fast passenger and freight service between New York and California ports.

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Thoughts for Humane Workers

From the "Humane Pleader" for April, 1928, we quote an editorial by Edward Bell in "The Animals' Friend" of London, England, that may well be taken to heart. Many well-meaning workers abhor any form of cruelty which they see inflicted on dogs, cats, cattle or horses, but complacently ignore that vastly greater misery to which millions of game and fur animals are subjected by their destroyers. We wish that this might be read and thoughtfully pondered over by every man or woman who wears the fur of an animal taken in a non-humane trap,—and by every other person. Mr. Bell's words follow:

The love of animals is a special gift, like a talent for music or language, and one of which the possessor should feel the responsibility and should try to turn to the best use. But just as the talent for music will yield its best results only when the possessor subjects himself to a somewhat severe training and devotes years to the drudgery of scales and exercises, so the humane gift will bear the best fruit only when it is based on a definite principle and cultivated with some system.

The error made by many earnest humane workers is that their sensitiveness for animals is not regulated by any logical principle. A semi-hysterical devotion to certain individual animals or certain classes of animals is not sufficient and leads to the loss of all sense of proportion. It gives rise to the frequent charge made against us that we are mere sentimentalists, and in this way many who give their lives to help our cause are liable in reality to retard our progress in the eyes of men.

What humanitarians need no less than others is a well-balanced view of life and a definite principle of action which they are prepared to follow fearlessly wherever it may lead. We do not decry sentiment, which is the basis of most that is good (and bad) in the world, but sentiment should be subjected to its scales and exercises before it can be trusted to perform in public.

With regard to the love for animals as opposed to that for humans, we may admit that animals are often more amiable companions than our fellow-men and show good qualities in which the latter are very de-

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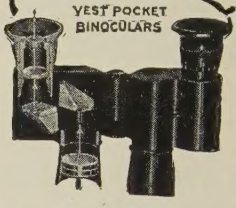

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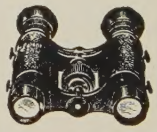

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ficient. For this reason many people prefer their companionship, and there can be no harm in this any more than in the fact that some people like to associate with children rather than adults, and some like quiet friends, while others prefer them to be noisy.

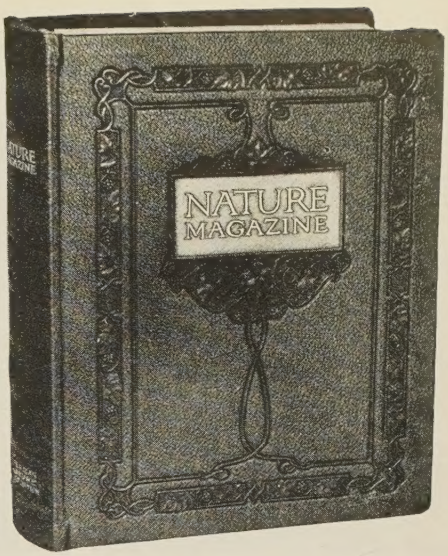
On broad principles the humaneness which confines itself to animals and feels no interest in suffering and unhappy humanity is a one-sided affair and does not accord with the ideal and perfect whole. There are people who suffer agonies if they hear that a cat or dog has had his leg broken, who, at the same time, will read with indifference of the privations and sufferings of thousands of their fellow-men and women, but it is not in our opinion a condition of mind to be proud of. Humaneness, whether exercised towards animals or men, is essentially the same quality, and while each one has the right to turn his practical benevolence in any direction most congenial to his nature, he should never lose sight of the fact that in limiting his sympathies he is warping his nature. Humaneness, which is another word for love, embraces all in the perfect mind.

Government Conservation

Conservationists took pride and glory in the Seventieth Congress, which passed at least two important conservation measures between political speeches, investigations, and filibusters. The McSweeney-McNary law authorizes enlarged expenditures during a ten year program of forest research, and is hailed by forest men everywhere as a great stride forward. The Bear River Migratory Bird Refuge in Utah was established, and appropriations made for safeguarding the millions of fowl from alkaline waters. One of the best examples of self-restraint was the pigeon-holing in committee of the Wingo Bill for the establishment of the Ouachita National Park, which, if passed, would turn a perfectly good National forest into a decidedly inferior National Park. The executive department took a hand in the good work by re-establishing the Pathfinder Bird Refuge in Wyoming, and five hundred acres on the upper Mississippi were given for a wild game refuge. The National Forest Reservation Commission recently authorized the purchase of 250 tracts of land in the East which aggregate one hundred and sixty thousand acres, and which will push National Forest lands past the three million acre mark. A new era has come in, evidently, since Uncle Joe Cannon resisted with voice, gesture and gavel attempts to buy what he called "scenery".

Nature Poem Contest

The Annual Nature Poem Contest for 1928 will close November 1, the Chattanooga Writers' Club, Chattanooga, Tennessee, sponsors of the contest, announce. The prizes are $20 for first and $10 for second, and are donated from the Elberta Clark Walker Memorial Fund, established by Robert Sparks Walker, naturalist and author, in memory of his wife. The Chattanooga Writers' Club will readily forward details of the competition.



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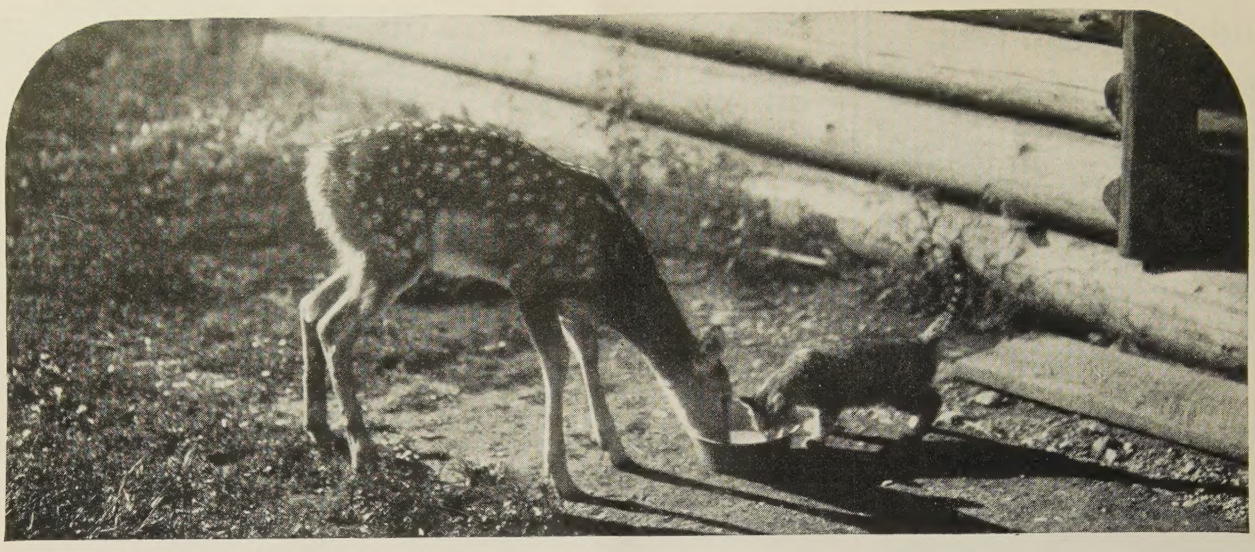

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TABLE OF CONTENTS

August, 1928

SIX BIRD WOODWORKERS ..... *Carra E. Horsfall* 78
NATURE CALENDER ..... *E. Laurence Palmer* 79
NO-MAN'S-LAND FIVE FATHOMS DOWN ..... *William Beebe* 81
TRANSVAAL DAISIES ..... *Edna Betts Trask* 86
WINGED FOREST GUARDIANS ..... *Tom Gill* 87
AMERICA'S LARK ..... *Gayle Pickwell* 91
A BEE LINE ..... *A. B. Champlain* 95
FISI ..... *Stephen Haweis* 100
THE SPINNING CRUSTACEAN ..... *Alexander F. Skutch* 103
PHOTOGRAPHIC CONTEST 106
YOUR LAWN ..... *O. B. Fitts* 108
THE SPORTSMAN AND THE WOODCOCK ..... *Edward A. Preble* 113
FEU AUX BOIS ..... *Nelson Courtlandt Brown* 114
NARCISSUS BULB FLY ..... *Charles F. Doucette* 117
ALBINO MOCKERS ..... *Rachel M. Hutchinson* 118
WINGS OF MYSTERY ..... *Alexander Sprunt, Jr.* 119
THE MT. RAINIER NATURE TRAIL ..... *R. A. Johnson* 122
HINTS AND HELPS FOR HOME AND GARDEN ..... *Harry R. O'Brien* 124
VENUS AND MARS ..... *Isabel M. Lewis* 126
DEPARTMENT OF NATURE EDUCATION ..... *E. Laurence Palmer* 128

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PILEATED WOODPECKER—*Phlaeotomus pileatus*

RED-HEADED WOODPECKER—
Melanerpes erythrocephalus

RED-BELLIED WOODPECKER—*Centurus carolinus*

HAIRY WOODPECKER—*Dryobates villosus*

FLICKER—*Colaptes auratus*

LEWIS'S WOODPECKER—*Asyndesmus lewisi*

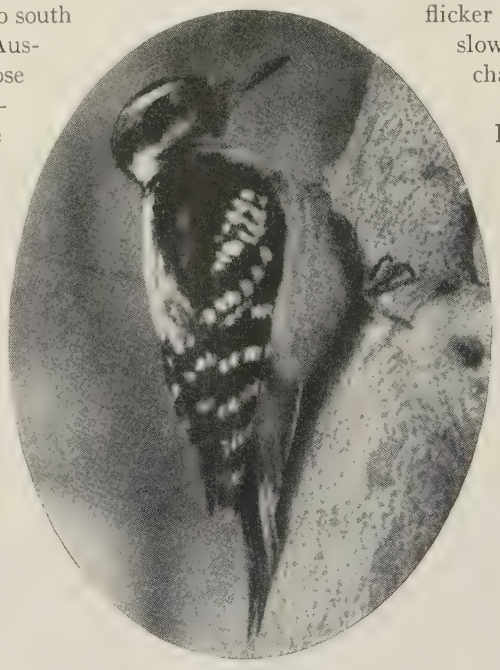
Six BIRD WOODWORKERS

by Carra E. Horsfall

WOODPECKERS are economically valuable. They are structurally fitted to feed upon the wood-boring grubs hidden far within the depths of our trees. Their long cylindrical tongues, usually armed with barbs, are capable of reaching into deep cavities for the insects. The only material used in lining the nest cavity is a part of the chips made by their excavations. The eggs are always white. In the temperate zones most woodpeckers are non-migratory, but most of the species of the far north must go south in the winter. Madagascar and Australia are the only countries whose trees do not benefit by the ministrations of these birds. There are forty-five species and sub-species in our country.

Probably the most widely known is the flicker, found throughout the United States and wooded Canada. The shafts and undertone of his flight feathers are yellow in the eastern species and red in the western. He is often seen feeding on the ground or perching across a limb. He also climbs upon the trunk in true woodpecker manner. Ants are his favorite food, but he destroys many other harmful insects and often eats a bit of fruit and grain. Both parents chisel the hole in decaying wood of limb or tree stub, throwing the chips out with their beaks and scattering them at the base of the tree. They also share in incubation and the care of the five to nine young. The black crescent patch on the breast and bright red band at the back of the neck are common to both male and female. The male has, in addition, a streak on each cheek simulating a mustache—black in the eastern, red in the western.

The red-headed woodpecker is a noisy bird as he hunts for his food in beech or oak woods. Apparently he is especially delighted when a locust is the object of his chase from tree to tree, each vying with the other in the volume of sound—the locust with a creaking squeal, the red-head employing his woodpecker language amplified. In common with others of his family, he eats some fruit in addition to the usual fare of insect larvæ. Perhaps it was due to the discovery of the grubs in green corn that he acquired a taste for the corn itself. Companies of these birds nest in rather close proximity to each other in the tallest dead limbs in their chosen neighborhood. They migrate only locally. The young resemble the adults except that they do not attain the red plumage on the head the first season, and are duller throughout.



THE HAIRY WOODPECKER

Pileated, one of the largest woodpeckers in North America, is the friend of big timber. He obtains a large part of his daily food of wood-borers from the dead standing trees of the forests. In these he also excavates the deep nests for the three to six eggs. He is unable to adapt himself to new conditions and with the passing of the deep forests he may also drop out of existence. However, he is still rather common in the wilder parts of his range. His call resembles that of the flicker greatly magnified. His flight is slow and direct, without the usual characteristic undulating movement.

Lewis is the most unwoodpecker-like of the family. The regular heavy beating of his broad wings and his habit of flocking, justify the name, crow-woodpecker, which is applied to him. His food consists mainly of insects which he captures on the wing as well as on the ground. To these he adds nuts and fruit. He is at home in old burns in the mountains, along river courses, or on fence posts in the open plains country of western United States and southwestern Canada. He seldom digs his own cavity for nesting but uses a natural hole or one left by some other bird. This may be from five to a hundred feet above the ground and will contain six or seven eggs.

The hairy woodpecker, in one of his sub-species, inhabits nearly the entire tree-covered portion of North America. The hairy and the downy are sometimes confused. The hairy is between two and three inches the longer. The males of both species have the red at the nape of the neck while the females lack this bit of color. Both are white down the back and have white spotting on the wings. However the outer tail feathers of the hairy are unmarked while those of the downy are barred with black. The hairy is a forest bird and not often found in the orchards. He is usually a permanent resident in his chosen area.

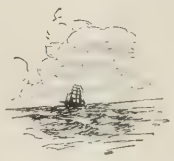
The red-bellied woodpecker is to be found throughout the lower parts of our middle and southern States, along the gulf coast to Texas and north through the Mississippi valley region into southern Ontario. Pine barrens, dense forests, open timber about plantations are equally desirable to him as he undulates from tree to tree in his search for injurious insects. He is fond of grain and fruit and in the orange-growing country is considered a nuisance because he punctures this strange new fruit which has replaced the wild sorts of his choice.

NATURE CALENDAR

AUGUST

by E. Laurence Palmer

SPEAKING of August Oliver Wendell Holmes quotes a friend as saying, "Intramural aestivation, or town life in summer, is a peculiar suspended existence or suspended asphyxia". Happily all of us do not talk that way, though August's heat may make us wish that we might retire permanently to the edge of one of the brooks about which Tennyson wrote, at least until we would be comfortable while sitting around in any clothes at all.



August is a month when we begin to think about our vacations or to take them. We don't take these vacations in one-hoss shays such as Holmes told us about but then the vehicles now used do not last a hundred years. Before you make up your mind where to spend the month it might be well to read Holmes on "Aestivation" in *The Autocrat of the Breakfast Table.* Comparing the mountains and the sea as a place for vacationing, he says that you can at least domesticate a mountain while this is impossible with the sea. The sea he says is "feline. It licks your feet, its huge flanks purr very pleasantly for you; but it will crack your bones and eat you for all that, and wipe the crimsoned foam from its jaws as if nothing had happened. The mountains give their lost children berries and water; the sea mocks their thirst and lets them die. The mountains have a grand, stupid, lovable tranquillity; the sea has a fascinating treacherous intelligence" and so on.

Holmes may have known the trees that grew on his mountains well. At least the woods selected for the squire's shay were well chosen. Oak, ash, elm, whitewood (tulip poplar) and lancewood all were chosen with good judgment but when you are splitting firewood around camp this August see if oak is the hardest of our native woods to split.

If one thinks of climbing a mountain this August a most happy preparation might be made by reading of a climb started seventy-one years ago the twelfth of this August by John Tyndall when he and others climbed Mont Blanc. This appears in "Glaciers of the Alps" and is particularly interesting in connection not only with observations common to most mountain climbs generally, but particularly in describing the end of the climb. The only thing that kept the climbers going was the realization that every twenty paces brought them that much nearer the top and that enough units of twenty paces would bring them there.

If one looks to the sea for his vacation, Dana's "Two Years Before the Mast" would be profitable reading. This would be particularly true for Californians because of the descriptions of early conditions in that state. It should be interesting to all readers of Nature Magazine because of the contrasts given there and in the forthcoming California number in October. While Dana gives us relatively reliable observation on whales, seals and other animals of the sea he is hardly so reliable with land forms. For example in his description of "coati" in Chapter XV and elsewhere he undoubtedly refers to coyote. Opportunity for hearing coyotes is decreasing steadily. Possibly it should decrease. If we can't hear them generally the country over there are plenty of noises of an August night to hold our interest indefinitely. The scurrying of deer-mice, the varied calls of insects, the night calls of birds and of frogs all challenge us to make as many identifications as possible. None of us will be perfect. Some may know the calls of mammals and nothing of insects. Others may be expert in the calls of birds and so it goes. August is as good a month as any to learn something new.

While coyotes may not be available for first hand study by us all, all of us can read again and with profit the stories about them by Seton who like Dana and Tyndall and Holmes was born in August. Many of us owe to him much of our interest in Nature and if we have not recently read his masterpieces can well include one of them in the list of our vacation books.

The "seeing eye" is not however limited to those who have and deserve reputations as Nature writers. Bret Harte tells us in "Tennessee's Partner" of a funeral procession through the forest as follows: "The redwoods, burying their moccasined feet in the red soil, stood in Indian file along the track, trailing an uncouth benediction from their bending boughs upon the passing bier. A hare surprised into helpless inactivity, sat upright and pulsating in the ferns by the roadside, as the cortege went by. Squirrels hastened to gain a secure outlook from higher boughs; and blue jays, spreading their wings, fluttered before them like outriders". Would that we had more writers to use Nature in making their word pictures effective.

THE SPOTTED SHARK

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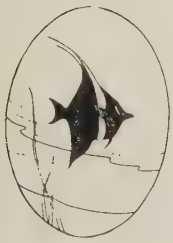


THE AUTHOR ON A CORAL REEF

TAKING NOTES ON A ZINC PAD

NO-MAN'S-LAND FIVE FATHOMS DOWN

Strolling Beneath the Waters on a Coral Reef

By William Beebe

HUMAN life is bounded by less than two hundred degrees of temperature, about five miles of altitude, and by the presence of a delicate mixture of gases called atmosphere. To win into a new phase of life outside these realms is to be born again in a new incarnation, and to relive the enthusiasm of far distant aquatic ancestors. Nearly four-fifths of the surface of the earth is covered with water, and although two-thirds of our body consists of the self-same fluid, yet we are so intolerant of this wonderful substance that we can breathe it only as gaseous clouds, paddle about on the surface of the liquid, and skate upon the solid. Five minutes immersion spells certain death to any of us.

Few of us have the opportunity to wander about beneath the water's surface on a Haitian coral reef, or anywhere else. It is fortunate, therefore, that one who does this sort of thing should be able to tell about it as eloquently as Mr. Beebe can. Reading this article is the next best thing to the real thing.

I have been fortunate enough to go St. Peter one better, and to walk about on the bottom of the sea during a winter in Haiti. In the course of three hundred odd strolls, one of the most astounding things was the color of

FILMING THE DEEP
Floyd Crosby taking motion pictures of the life on a Haitian coral reef

A CORAL INHABITANT
One of the many interesting forms of undersea life

this new world. With constant use of the helmet and clear glass windows, there came after a while a forgetfulness of the new medium I had entered. High and low tide lost all meaning; the shore, as a definite thing, became non-existent, and my mind completely bridged the gap between the last view of the palms and mangroves which blurred out as I submerged, and the first clear glimpse of the same littoral slope so forever wet that one never thought of it as even damp. A dew-drenched lawn is wetter by far than anything I have ever sensed beneath the waves.

As to color, time after time I have come out of the water with my mind crowded with color impressions, but never primary harsh reds or blues or greens. Now too, I realize the importance to an author of the ultimate connection between colors and their man-given names. Striving to fix and identify remembered hues of a coral grove, I lose faith in my memory when, in my color book, I find them listed as Russian blue or onion-skin pink. I know the exact shade of a certain feathery sea-plume, but resent having to refer to it as zinc orange. Yet I am always pleased when I detect salmon, or pearl-grey or ultramarine. How I wish that the inventors of the names of colors had been imbued with the simplicity and the imagination of those who, through all the years, have acted as little Adams to the flowers.

Some day, when I can carry a color book in my helmet, I will be able to enumerate an exact color code of distance. Even in our colder, thinner atmosphere the green of mountain slopes softens to purple a long way off, but on the bottom of the sea, still greater changes take place within a few feet or yards. I have walked backward and seen a feathery-crowned sea-worm of dragon's blood alter, in my vision, within a few seconds and steps, to the palest of coral pink, while a sea-weed, deep olive-green when within reach, comes gently to the eye, when five yards away, as faintest glaucous.

An artist of great skill and patience can approximate the oxidized royal purple of a gorgonia, even the pink and ivory sunset of a conch shell,—but the vanishing coral reef ends and the mysteries of the unknown deeps begin the illusion, too subtle for color, of submarine visual infinity—this is not to be whelmed by man-made brushes nor imprisoned on any terrestrial dimension.

It is the custom nowadays to "do" a city in a day, or a cathedral in an hour, or even to produce a volume of solemn critical comment after the most frightfully superficial observation. The newcomer to a coral reef, the tourist diver, has, however, no Baedecker at hand from which to filch values and ideas. To remove one's helmet spells death, but in other ways the most blasé observer must somehow feel and show the awe which is inspired by his first few descents.

I had dived many times in Cocos and Galapagos waters and there I found myself always in a background

PORCUPINES OF THE WATERS
The sea urchins on the ocean bottom extend their long black spines

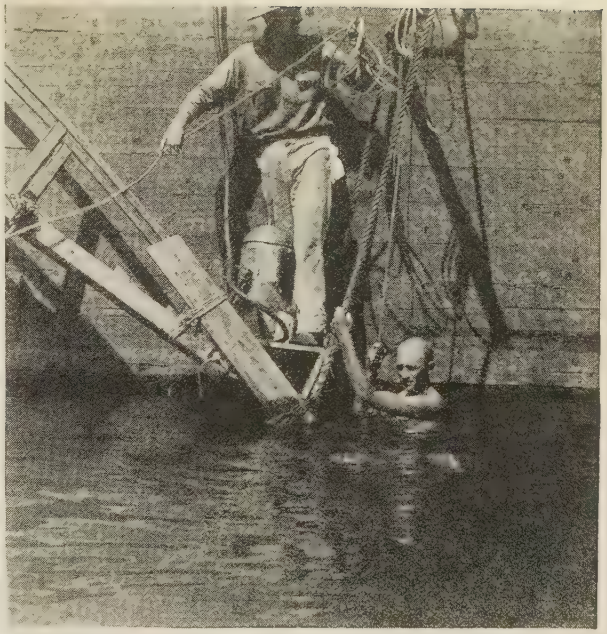
of somber, purgatorial aspect,—mighty masses of dark lava and volcanic outbursts setting off the procession of thousands of gorgeously colored fish. Here in Haiti, the surroundings were of equal brilliance with the living, moving inhabitants, and adventure and activity so omnipresent that hundreds of descents have still left me with ability only to present separate vignettes, individual mosaics, which future study will mould into more accurate appreciation of the life of the reef as a whole.

My favorite method of going down, when the bottom is only three or four fathoms away, is to discard the rope or ladder and, balancing carefully, to sink direct. It gives a delightfully terrifying effect of falling slowly —the realization of a nightmare dream which ends safely.

My first Easter dive landed me on a large mound of brain coral, cracked in the middle not by frost but very likely by an earthquake. I revolved slowly, feet close together, like some weird representation of the North Pole on top of the world. The wall beyond visible distance precipitated a score of smudges which darkened and finally crystallized into a school of purple-finned surgeon fish, accompanied by three angels, quite new to me.

A great moon of jelly passed majestically, and its shadow, apparently of far denser substance than itself, swept across a sandy path beneath me, for a moment sending a starfish into total eclipse. Then a numberless school of tiny fish swam past and around like a swarm of twinkling cometlets. A mighty grouper sneered up, rolled his bulging eyes up at my stream of bubbles and backed away. Perfect quiet held for a time, and then a spotted shark—the first one since Galapagos—weaved around a maze of lacy millepores, saw me, hesitated, and went steadily on its way.

I slid to the sand and looked about, and as usual, it was borne upon me that no more imaginary Martian or prehistoric landscape could be imagined. Within sight were pebbles, boulders, cliffs, fields of heather, beds of ragweed and phlox, single plants in full bloom of chrysanthemums and forget-me-nots, as well as shrubs, giant ferns and mosses, and yet there was not a single strand of vegetation, of algae even,—all were living animals.



THE AUTHOR EMERGES
Mr. Beebe regains the surface after a sixty-foot dive to the reef below

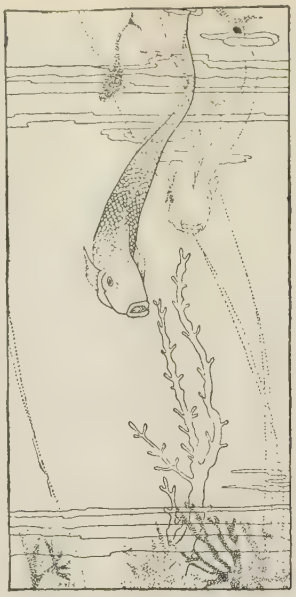
SOME UNORTHODOX WORMS
These are coral worms resting upon a bit of coral undersea

I chose today to walk a few yards or half drift slowly along, then sit quietly and watch a single sandy glade or coral castle for adventure. I selected a cushion of soft growth upon a coral stool and let my eye drown itself in the color all about. My attention kept going back again and again to a great font of a sponge. It was not especially striking in size nor of perfect symmetry, nor of unusual brilliance—a grayish violet as I remember,—but it was *satisfying*, a characteristic indefinite but very real, if only we will relax before things about us and let unimportantness fade away.

As I looked, my memory shifted forward and back and at last came to a rest upon the

A SUBMARINE LANDSCAPE
Luxuriant is the varied life that is found on the reef of coral

wonderful tale of the pursuit curve of the Greeks, the *tractrix,* of which a great philosopher once told me. It was the ideal curve which had a definite beginning or start, but whose arc left no inkling of continuance or of exact radius. It was the pursuit curve, and to my joy as I thought of it in my water-buried, helmet chamber, I actually saw it enacted. A coral and a gorgonia had grown together almost at right angles and down the latticework swam slowly a small parrotfish. It traversed the side of the gorgonia and half the straight line of the coral, when there darted out from a diminutive cavern, just beyond, an infuriated butterflyfish. The latter was half the size of the other, but eight times larger emotionally, and with sharp spines erect, it fairly flew in defense of its home. With a six-inch start the dusky parrot turned and streaked for the most distant point in the world. But he was not versed in retreat and retraced his own wake to the very corner. The two little people of the sea were oblivious to everything except one another but soon it dawned on the parrot that he was racing into a cul-de-sac, and putting his tail hard a-port he swung out, thus avoiding the sharp angle of the coral and gorgonia and setting his course toward the center of the sea-fan. The butterflyfish, a short distance to the rear, at once followed suit and both soon vanished from sight, but not before, five fathoms deep, they had re-enacted the two soldiers fleeing along the walls of Troy. Here, in mid-water was drawn for me the wonderful *tractrix* itself and now my eye wandered back, and it seemed very reasonable that it was the lines of some similarly marvellous curve which gave solution to the eminent *satisfactoriness* of the great sponge font standing before me.

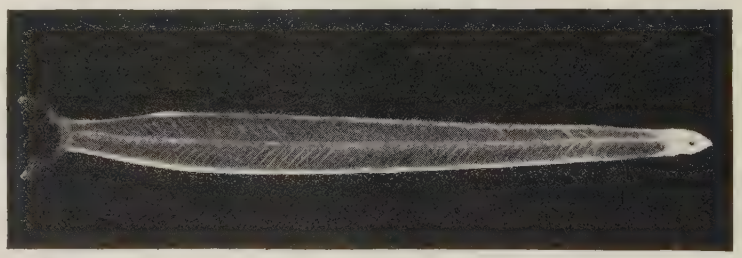


I was still in the canyon of brain corals and leaning upon one. I could look across at a half dozen others, appearing for all the world like a cluster of African huts in a tree-shadowed kraal. The wandering lines and paths of this well-named *Maeandrina* coral recalled the furrowed, rain-worn gullies and terraced slopes of the western Himalayas. From the crevices between mounds sprout tall, waving shrubs of horny coral sea-plumes, not only aping vegetation but reversing the manner of plants. One long branch which waved across my helmet glass was deep-furred with thousands of dull, mouldy-brown polyps, aligned along the stem. At a touch from my hand all vanished and revealed the clear, bright purple of the bark and trunk. Sea-fans waved less pliantly, like starched portières, or like English fruit trees broken away from their flat garden walls. Many of these showed parasitic growths among their branches,—mistletoe-like sponges and shells and tall, stately hydroids.

Here and there on the brain coral mounds sprouted little, double-spiralled worm pagodas, and over the tan surface slipped small, blue-lined gobies. Unnamed monsters slid over the horizon, more bizarre than any dragon of old or ancient hillside of fable.

At my very elbow a pagoda worm expanded. On the rear side of the summit of the creature was an absurd bit of flat mother-of-pearl shell with several strands of sea-weed growing from it—a defect, a disease perhaps, or a bit of broken shell from some snail entangled in the tissues of the worm. Aside from this the gorgeous gills were perfect and symmetrical. The piece of extraneous matter annoyed me; it was as meaningless as the ruff of a sleeping golden pheasant, or an undeveloped photographic plate of the Taj Mahal.

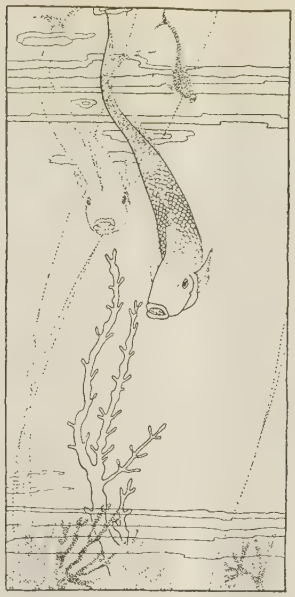
In this land miracles can be worked with a shadow, and my hand passing between the sun and the worm sent the whole affair hurtling under-coral. The defect now became perfection. Nothing was visible to the onlooking eye but a few casual strands of sea-weed, duplicated in a hundred neighboring places. The thin plate of nacre had been drawn with lightning swiftness after the vanishing worm, and dovetailed exactly into the entrance of the narrow tunnel. We may now compare it more logically with the operculum of a snail or the trap-door of a spider's nest. Rather I chose to think of it as some secret entrance, where the cunning touch of a spring rolled away a boulder and displayed the silver stairway to a fairy palace. Here in the midst of the East End of Polypdom, typifying in their eternal



AN ODD DENIZEN OF THE SEA

(Below) So varied and interesting are the scenes on the ocean bottom one is tempted to stay

monotony of meanderings the socialistic standardized equality of the coral builders, was the winding palace tunnel with its silken-smooth lining of mother-of-pearl, and its aristocratic inhabitant of forget-me-not blue. The whole was only another under-sea "Exile's Club"; a submarine glimpse behind the looking glass —this time of the flower going back within its stem. Lest this momentary flight of fancy should seem to dominate our vermiceous emotions I take occasion properly to introduce this worthy being as a member of the order of *Polychaete* worms, branch *Cryptocephala*, sub-order *Sabelliformia*, family *Serpulidae*, and species *Spirobranchus tricornis*. Its maroon and buff cluster of gills, which seem also to serve as sensory organs, are one of the commonest objects to be seen scattered over the surface of the great coral heads in these undersea gardens.



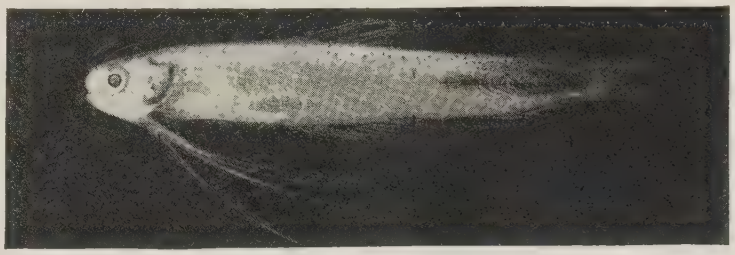
Leaving my comfortable cerebrum coral mound, I moved slowly away toward an open field of tube sponges, —factory chimneys coming to mind with unpleasant vividness,—and others which to my terrestrial eyesight recalled vases, chalices, cups and ewers. I was impelled to engage in my favorite underwater sport of sponge stuffing.

Before diving I had tucked a large wad of absorbent cotton inside my belt and, with my knife loosened in its sheath, I now pushed through the water, leaning heavily as though against a strong wind. Soon I saw the black, gaping mouths of a colony of sponges, and finding the leeward side of the current, I crept up slowly and shifted my helmet so that I looked out through one glass only. When I pulled out the cotton I was held for a moment by its beauty and the similes it brought up. Cotton in the air is heavy and gross. Tossed up, it drops to earth more directly than a leaf, but in water it becomes a thing of marvellous beauty. I involuntarily looked upward, but the ceiling of the troubled surface barred my view, and there was only the absurd keel of the motor boat rolling slowly about. What I looked for was a fleecy cloud, for that was the exact counterpart of my handful of cotton. I found another new characteristic of cotton in my watery element,—cotton gravitation was almost suspended. I launched it in mid-water and there it stayed.

I tore off a bit and stuffed it into a finger-sized sponge, then reached for another, but the whole cloud had blown clear out of reach. Two seconds later the swell brought it back to my elbow and now I stuffed my sponges rhythmically, one to each sway of the cotton. Once the swing was broken and to my dismay my cloud acquired a new rhythm of its own and sailed off with a myriad of trailing strands. I pursued, caught it and found that a jellyfish, so transparent that it had passed unseen close to my eyes, and collided with my wad of cotton, pulsated deeply within its tissues,—and cotton cloud became mobile jelly forthwith. I shook the jelly free, leaving a host of tiny tufts adherent to its tentacles, to aid or impede its future path of life.

Returning to my work, I pricked my finger on an urchin's spine and involuntarily jerked my sponge bush, whereat a tiny lithe fish darted out, shot up to my helmet, looked in, and slipped back into the sponge between my fingers—all in an instant of time. I rammed the cloud plug after him and gently began to pry the colony loose.

At this instant I saw a new thing—an absolutely new thing to me—something in which my years of study of ocean forms of life helped me not at all. It was floating in mid-water, oval in shape, surrounded by a band of waving fin, while hanging down in front were two strange appendages. I left my clump of sponges, slowly gathered up the cotton cloud and crept after this phantom. I gained on it, and saw two large eyes. Then it shifted its backward progress, swerving about a branch of coral and, from the side, my monster became the foreshortened body of a great squid. With the magic of sea things, he was floating gently in mid-space, keeping just out of reach of my itching palms, and scarleting and palliding as nothing in the world but a squid can. I stood upright and looked down. All its arms stretched out for an instant in my direction, and out of the transparency of the waving fin there slowly grew two more eyes, eyes more terrible than its real staring



THEY CALL HIM *BREGMACEROS*

(Below) Coral spreads its delicately beautiful arms, beckoning to the student of the deeps

orbs, because of their very unreality and brilliance. They seemed to gaze stolidly, unemotionally at me, until suddenly the apparition changed appallingly, and heavy, shaggy eye-brows appeared,—eye-brows meeting in mid-brow, where yet there was no brow,—scowling straight, unblinkingly. The lids and pupils—all were clear and distinct. After they had looked at me for a space of time which might have been a second or a week—they gradually faded away,—no whit unlike Alice's cat,—and the tail fin of the squid showed again, white and unmarked.

I pursued some way further, until the path was too becoraled and sea-urchined for careless walking, and then I returned to my sponges. The cotton had worked partly out, the lure ends floating and drifting, and the chimney simile was heightened by this flaring smoke pouring down current from the mouths. This time I allowed nothing to interfere with my securing of the colony and started back for the boat.

The way was obscured and the ladder had vanished from sight, so I looked for the floating hose by which to set my return course. Without warning there fell at my feet a good sized anchor and, looking up, I saw the keel of the schooner's big jolly-boat. I knew of no reason why this should have followed us, and so prepared for a return signal along the hose. None came, so I went on and stumbled over another beautiful clump of sponges. No landscape gardener could have improved on the exquisite combination of colors and forms. There was a semi-circular border of stone-grey, soft spined sponges, while within there rose three beautifully-moulded vases—two tall and symmetrical, one shorter and gracefully bent, of the sheerest violet, the sponge tissue frosted over with a delicate mist of shining crystals. Two of the gray tubes had variegated flower worms blossoming in them—like glorious lilies in drab flower pots, but while in the latter case we have living plant and dead clay, here it was animal and animal. But,—there were other days coming—so I went back to the world of men.

TRANSVAAL DAISIES

The Dainty Scarlet Gerberas

by Edna Betts Trask

BEAUTIES OF AFRICA

Brilliant red they are in their jungles, but soft, dainty pink shades have been bred for the garden

TO WRITE of daisies is to invoke a familiar picture. If the reader comes from the eastern States, he will see in his mind the fields of "white-weed", while the Californian recalls the large white Shasta daisies or the yellow and white marguerites. Most amateur gardeners have a definite vision of this "sun-flower" type with its colored rays of narrow petals surrounding a central disc. But I write, however, of the original Transvaal daisies, growing in distant South Africa, whose brilliant scarlet red runs riot in true tropical mad profusion.

The flaming color makes the daisy difficult to use in the garden, for it does not combine happily with other colors. New shades, however, have been developed through hybridization, and there are now numerous tones of pink, a color which has been much misunderstood due to the fact that cataloguers insist on calling "lavender" pink. There is no color so dainty, so soft and warm as true pink, and this is the color which can be secured in the hybrid gerberas of today. Shades of yellow and orange are also listed.

As to their culture, it is very simple. They love the sunshine, but must be protected from severe frosts. In a mild climate, as in southern California, they need no protection at all. As their stems and leaves arise from a crown, care must be taken that this part of the plant is not below the surface of the flower bed, in which case the crown might rot. Another precaution to take is one against too much irrigation. The roots of the gerbera extend deep into the soil where they can remain cool. Too frequent sprinkling tends to encourage these roots to remain near the surface where they will be in danger of drying out. Also, too much water may result in a wealth of leaves and few flowers.

These many colored flowers keep a long time when cut, a characteristic of all the daisies. They combine beautifully with very small, feathery white flowers and a little green background greatly enhances their beauty.

Winged Forest Guardians

by Tom Gill

U. S. ARMY AIR CORPS

It might have been smoke. It might have been mist rising.

Twice we sighted it far ahead and a little to the left—a thin wisp of thread-like whiteness. Twice it lost itself among the dark expanse of pine that lay like a great uneven carpet woven in numberless shades of green. The cold morning air, keen and clear at that high altitude, stung our faces as the plane sped north. Then again we caught sight of that thin, twisted thread curling up out of the mists of morning. No doubt this time. It was smoke.

It was the forest's age-old enemy, fire. In two minutes, certainly not more than three, we were circling above it. The wind shrieked and whistled through the wires as the pilot shut off his motor and began in great wide spirals to descend. I watched the altimeter needle as it registered our rapid fall. Five thousand, four thousand, then two thousand feet—and now at an elevation much too low for comfort the pilot again started the motor humming over the forest, so near that I could make out each individual tree, and the road that curved like a white ribbon beneath our dipping plane.

Not a large fire, but beginning to burn rapidly through the young spruce. Twice we circled to see if fire fighters had arrived, but no sign of human activity reached us,—just a line of flame licking hungrily along the slope and a long white funnel of smoke that trailed off in the morning wind. The pilot turned and above the motor's roar I heard his voice: "I'm going to turn this in", he shouted. It was a twenty-minute hop to our nearest landing field, and the world sped by us as this time the pilot turned the plane's nose toward the rising sun.

FAIRCHILD AERIAL SURVEYS, INC.

HOW THE AIRPLANE MAPS

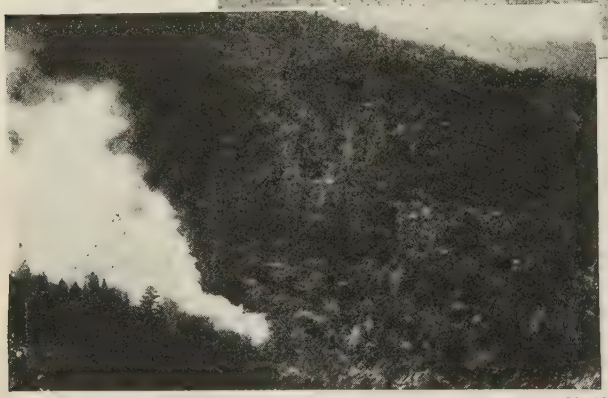
At 10,000 feet, an area of fifteen square miles is surveyed at each exposure

With the skill that only long practice gives he squeezed into the narrow landing field, then shut off the motor just in front of the forest guard's cabin. The Supervisor happened to be there and as he walked toward us, the pilot called, "You've got a fire back there in Dead Horse Gulch. Let's have that map". Together they bent their heads over the map and in a moment the pilot had located the scene of the fire. He pointed, "It's just above where that little creek comes into the main canyon,—you know, just after you pass the road to Lone Duck Ranger Station. The Supervisor nodded quickly. A few rapid orders were telephoned and all within the

OFF FOR THE PATROL
Nothing escapes the notice of these eyes

U. S. ARMY AIR CORPS

THE FIRE GOD ATTACKS
A white funnel of smoke marks the start



U. S. ARMY AIR CORPS

space of minutes a forest guard far down the creek had been sent out with men and tools, a fire lookout miles away had been cautioned to watch that section of the country for further signs of smoke and the District Ranger had been called back to headquarters. Then, with our work done, we sat down in the autumn sunshine. It felt very welcome after the chilling cold of the upper air.

The Supervisor spoke first. "You can talk about the advantages and disadvantages of airplanes for fire fighting, but it's in just this kind of emergency that nothing can ever take the place of the plane. That particular section of the country isn't under observation from any of our fire lookouts on the mountain tops. There's no way we can look down into it and there is no way we can discover a fire in there until it grows so big it would cost lots of time and money to put it out. The airplane solves all that.

"There will always be things that a plane can do in this forestry game that we can't get done in any other way. That's far from saying that we can quit all other methods of fire fighting and depend entirely on you pilots". The Supervisor filled his pipe.

"I remember", he went on, "It's getting to be some years back now—but I remember when planes were first used by the Forest Service to detect forest fires. It was right out here on the Pacific Coast, too. At the end of the first year we had all kinds of reports from forest officers. You could have proved anything you wanted as to the value or uselessness of the airplane from those reports. But most of us had confidence in it. Most of us knew that it was a new game both for the air men and for our own forest officers, and we knew it was going to take time to get together and to work with some kind of intelligent harmony. Of course there's this disadvantage about an airplane; no one section of the country is under observation for any length of time from a plane. You fly over this cabin say at ten o'clock in the morning, and until ten o'clock the next day, unless you are running more than one patrol, we could burn up right merrily and no plane would ever catch it. That's where there's always going to be use for the stationary lookouts we've got perched up on our high mountain tops. At times these lookouts aren't worth the paper it takes to appoint them. That's in bad fire weather when the whole world seems covered with a smoke blanket. Your lookout might just as well take a vacation, because there's nothing he can see. But it's just at that time airplanes very often can pick up fires that otherwise would go unseen. I remember a State Fire Warden taking a short plane trip just to see how things stood during a spell of smoky weather that put every one of his stationary lookouts out of business. Well, in the half-hour he was in the air he discovered just eighteen fires he didn't know he had. It was worth a good deal to that Warden to know about those fires and he couldn't have known without the old airplane".

The pilot nodded. "Both methods have their uses. It's been a case of fitting each in the right place, hasn't it"?

"Just that. Very often during big fires our boys can't tell where the head of the fire is, which way it is going, or in the rush of getting organized exactly where they should start fighting. It means a lot to be able to get a plane, fly around that fire, and pick up some idea of where the battle lies. Then, you know, on some of these western forests we have what you call lightning fire zones,—country where the lightning seems to delight to go. Maybe one storm running through will start forty or fifty fires in a few minutes. It's mighty helpful to be able to send a plane through after one of these storms and see just where our fires are beginning. Very often it may be some old smouldering stump that our lookout could not catch for days, but the plane flying directly over will pick it up and give us a chance to jump on it while it's small".

The Supervisor smiled. "And we haven't suffered from a lack of suggestions telling us what other uses we could make of the plane. But sometimes these suggestions aren't too practical. There's one chap keeps writing in telling us we are missing a good bet by not carrying some kind of fire fighting liquid in our planes, and every time we sight a fire, douse it and put it out. Sounds simple except that the weight of the stuff alone would keep a plane getting off the ground. And after all an airplane can't hover about like a bird,—it's got to keep moving.

"Sometimes, too we get results from planes that we

never expected. In one National Forest out here on the Pacific Coast we had plenty of trouble from a tribe of Indians setting fire to the woods because they thought fire would help the growth of the berry bushes. I suppose some of them did it just out of pure cussedness, too. We tried to stop it but our success wasn't conspicuous. Next fire season it happened that our airplane patrol began to cross directly over that country. When those Indians saw the big white birds, as they call them, they firmly believed that the pilot up there was watching everything they did and was ready to swoop down on them whenever anyone acted suspiciously. It stopped the fires up in that country, and we haven't had a sign of trouble since".

I turned to the pilot. "How does the Army feel about this type of work; do they think that it's worth what they are putting into it"?

"They feel it's worth a lot more than that. The Air Service finds no peace-time activity that so nearly resembles flying under war-time conditions as this forest fire patrol. It's great experience for all of us, especially for the young aviators we have in training. It's a lot harder than the ordinary cross-country flying. It takes more courage, greater ability at map reading, and gives us a chance to find out how much judgment a man's got".

So listening to these two,—to this man of the forest and this man of the air,— as we sat there in the warm October sunlight, it seemed to me that this mutual helpfulness between the air game and forestry was, after all, a very fitting thing. For they are both young professions, both are colored with the romance that comes with adventuring and with far-off places. Then, too, forestry had played no small part in the youth of the flying game. In those early days of the war when the need for planes and for the materials planes are made of came suddenly upon an unprepared country, almost overnight, thousands of feet of spruce, the finest spruce our forests could give, were needed for airplanes. And it was the forestry regiments that went out into the tall forests of the Northwest, where the best spruce grows, and made possible those needed shipments of timber.

When the war had finished and peace-time uses were sought for the airplane the forester was among the first to adapt it to his many needs. And fire fighting isn't its only use. I had seen planes used in Mexico to find out what forests grew in those unknown and unexplored regions. I had seen them used in that mountainous island of Haiti by the Forester in his own work there.

For the forester among other things needs to know just how much timber he has to work with, where it is and how old and how good it is. He needs to know these things just as an engineer needs to know the amount of rock and cement and strength of beams he is working with. But this kind of knowledge, especially in heavily forested regions, is difficult to get and expensive. It is not so expensive if you can fly over the forest, taking pictures of it from the air, and then match together those pictures into an accurate map of what lies below. Much can be learned from a map of this kind. You can tell what part of your country is dense forest and what part is swamp or open land. You can tell what part is heavy, mature timber and what is young or immature. You can learn many things that you never suspected. You may find that in the center of your forest region are large areas of timber overthrown by wind or fire killed. You may find patches of forests infested with beetles, or areas that are dying or dead.

Up in Alaska a photographic survey was made by airplane of the great spruce region there. When the pictures were developed foresters learned not only a great deal about the timber, but they also discovered a number of waterfalls they never knew existed,—an important discovery since waterfalls mean water power.

Many timber land owners today are having maps made of their timber by the airplane camera. A camera perfected within the past four months takes a picture covering fifteen square miles of the earth's surface at each click of the shutter. The work is usually done at an altitude of about ten thousand feet and the pictures are taken so that they overlap a little on all sides. Assembling these photographs gives a map of high accuracy and wide usefulness.

So in addition to locating fires from the air, the forester is using the airplane to help him map out his forests and to tell him what these forests contain.

But even these uses do not make up the whole of the work that the forester is doing from the air. In the past great plagues have struck our forest and park trees

U. S. ARMY AIR CORPS

WAITING FOR ORDERS

The plane is always ready for action

A DESTROYED FOREST

An airplane might have saved it

The memory of the chestnut blight has not yet faded from the minds of foresters. The gypsy moth, the spruce bud worm,—against these destructive insects the forester must be ever on guard. And although against most of these pests he has found no satisfactory attack, in some cases he is being helped by his winged ally. In Minnesota not long ago five hundred acres of hemlock forests were attacked by a worm that destroyed many thousand feet of timber. Next year the worms returned in still greater numbers. Something had to be done. It would have been an almost hopeless task to use the ordinary spraying apparatus. "But why not dust the trees with poison from a plane"? some one asked. Many shook their heads. It had never been tried. But at last they did try it, and a plane was called. Seven tons of calcium arsenate were dropped on these worms within a few short hours,—and the battle was won.

A grove containing nearly five thousand catalpa trees was badly infested with caterpillars a few years ago. The pests covered every tree. Again a plane was used to spread poison dust on the invaders. The work took just fifty-four seconds. In less than a minute ninety-nine per cent of the caterpillars were destroyed. The plane had flown at a speed of about eighty miles an hour, twenty to thirty feet above the ground. The dense cloud of poison dust that trailed behind it floated through the catalpas and covered the foliage in its passage. Not a tree could be found whose leaves did not bear some particles of the deadly poison.

Six times the plane passed over the ground and deposited about one hundred and seventy-five pounds of poison. Two days after the fog of poison dust had settled over the invading army of caterpillars, the ground was literally strewn with the conquered hosts. They hung to the branches and foliage, they were lying thick on the forest floor, they were strewn about on the fence posts and the paths. Not a step could be taken without crushing numbers of them.

Scouting has always been one of the peculiar prerogatives of the airplane, and just as in war times men called it the eyes of the army, so now it is used as the eyes of the forester. A sudden attack of bark beetles in California brought to foresters the necessity of learning just how severe this invasion was and where these minute tree killers were thickest. Planes were called and flew for a few hours over the suspected area, then returned with their photographs. The weakened and dying trees showed up in colors different from those of their healthy companions. Whole groups of beetle-infested trees could be picked out from the photographs. Some trees had died and looked like tiny five or six pointed stars in the airplane pictures. As a result of this rapid, inexpensive reconnaissance, foresters learned where the attack was, how severe it was, and within a few hours could formulate their own plans for counter attack. It would have taken weeks to get the same information from men working on the ground.

Peace time uses of the airplane are far from exhausted—in the field of forestry they have just begun. And as the practice of forestry grows there is every reason to believe that the forester's winged ally will keep pace.

Some day the scars of forest fires and of destructive lumbering will have to be covered over by trees. We cannot afford to let those areas lie idle. On millions of acres man will find it necessary to help Nature by sowing seed. It will be a tremendous task. But when that time comes, perhaps here, too, the airplane can continue its help to the forester and spread tree seeds over those denuded acres just as it spread poison over the hemlock and catalpa groves.

As the forester moves forward in his ever-increasing task of keeping a rapidly growing nation supplied with timber, he will need all the tools that science can bring to his aid. Fifteen years ago foresters began laying aside their chaps and high-heeled boots and reluctantly learning the unlovely but efficient ways of the flivver. Today, thanks to the plane, they are learning that certain things may be done from the air much more quickly and often more economically than from the ground.

AN AIRPLANE PHOTO

Cruising, spotting diseases, locating fires are only a few of the things planes can do

ON THE WATCH

War time eyes of the Army have become the peace time eyes of the guardians of the forest

HE STOOD THERE IN THE KINGLY WAY OF LARKS

Fearing nothing, caring only for his young, who hungered and should be fed

America's Own Lark

Kin of the European Skylark of Song and Poem

by Gayle Pickwell

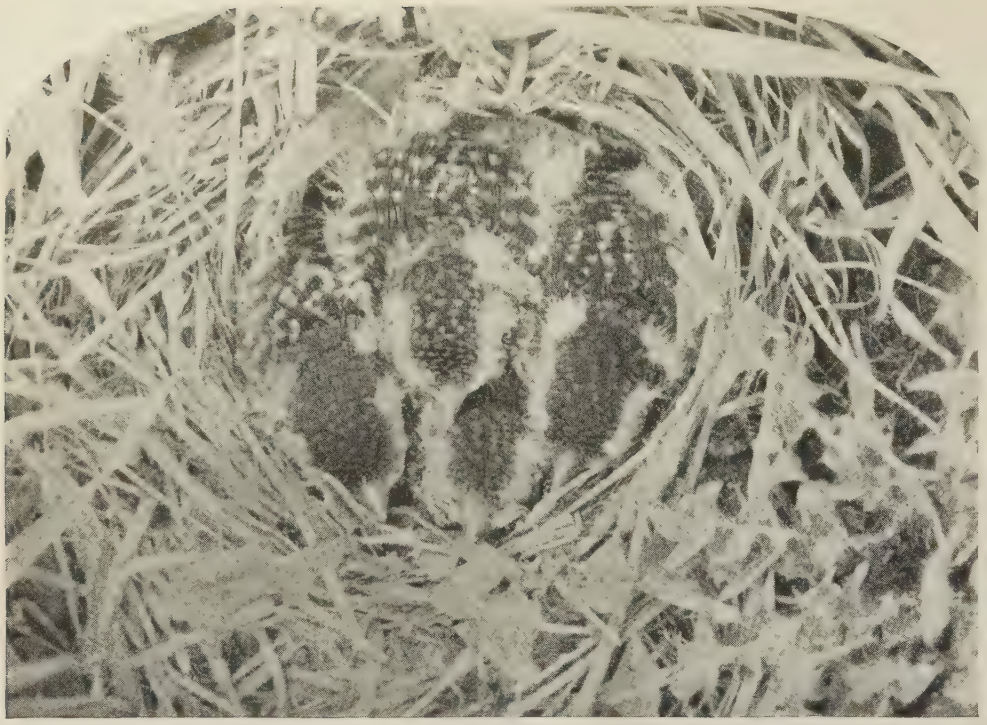
Photographs by the Author

A SPECK against the ragged clouds the lark sailed, heading now into the wind, mounting up and up that he might float on widespread wing and outflung tail. It was America's lark,—the horned lark,—singing as he flew, throwing out upon the air his "pit wit, pittle, wittle, little, little, leeee"; trailing off on "little lee" as he climbed for another sail. Here was a true lark indeed, the sky his heritage in which to sing.

For five minutes that speck of bird hung in the blue, now climbing, now sailing and singing,—a songster's nearest approach to heaven. The ruffled mounds of scurrying white that were the clouds seemed just above the lark. Against them the outspread chorister showed in striking silhouette. Finally, with a last "pit wit", the joyous bird came down in a dazzling, thrilling, headlong dive straight to the meadow. The sheer audacity of that feathered plummet! But, when lacking a mere score of feet of the rising earth, he opened his wings, checked his tumultuous descent and alighted gently near me. I breathed again. Friend prairie horned lark looked at me calmly,—upright in the kingly way of larks,—tipped up his horns to show his amiability and addressed me in mild curiosity with all the assurance of his royalty. Said he, "pseet, pseetit". I could naught but agree.

Mr. Gayle Pickwell is no newcomer to the pages of Nature Magazine, but we feel that he has attained new heights in his writing in this article. He is a native Nebraskan, lately of the zoology department of Northwestern University and now at the San Jose Teachers College, San Jose, California. Aside from brief attempts in the directions of law and journalism, Mr. Pickwell has held to a youthful and active interest in Nature, to which he has dedicated himself. We feel, however, that the journalistic training is amply reflected in his writings, and that Mr. Pickwell, a young man still, has an excellent future as a naturalist—writer and educator.

It isn't the song of the horned lark that thrills,—it's the method. With a stop watch I timed the tumultuous dive and found that it consumed an average of fully five seconds. Five seconds of drop to earth! If one were to discount the effect of air friction, then the larks deliver their flight song at a height of two hundred feet. They climb to that altitude by vigorous undulations of flight, mounting up and up as if climbing steps in the sky. As they ascend they sing not at all, uttering occasionally, as they flutter, a sharp "pseet". When satisfied with the altitude they open wide both wings and tail, sing their stanza, and close promptly that they may recover lost ground for another sail. Now and then they fly on wide even wing beats, showing truly their kinship with the



READY TO LEAVE
The nestling down gave way to juvenile plumage, and the call of the world grew loud

skylark of Europe, and they have a song to suit the flight. Then they sing "pit-wit, wee-pit, wee-pit, pit-wit" in an even, vigorous recitative. If the wind permits they fly in circles and five minutes of singing may leave them immediately over their starting place. But the lark sings not only on the wing; an humble clod may serve him as stage and nightfall finds him tumbled down from the sky but still singing on his barren spot of earth.

It was the male prairie horned lark who showed me his family. I wanted to study him, for he is America's only true lark. His mate might have been watched the day through and then the location of the treasured household would remain a mystery still. It is ever so. Males cannot keep secrets. This father's confidence in strangers was deep and abiding. I was a matter of curiosity, momentarily to be viewed with interest, shortly to be forgotten in the ever-pressing feeding duties to his family. So I had not stood long in the vicinity where the female called her one sharp distress cry until her dispassionate mate came in, viewed me calmly, walked up to the nest with the food and, tarrying not, went out again for another burden. Even then, though he had pointed out the nest to me, I was forced to await his return to locate it definitely, so cunning is Nature in the defense of her careless children. But, after the second instruction, I walked up to the clump of bluegrass, whistled "pseet, pseetit", as the parent birds had informed me, and what had been drab, tan soil before, turned, in one little oval, to five gaping, creaking, bright yellow maws.

With all that luxuriant meadow of heavy clover and wild barley to choose from, the larks selected the barest ground of all. The nest, built of stems and lined with grass, was flush with the surface of the hard-baked soil and set in a cup of exquisite neatness. Unconspicuous it was,—a few straggling bluegrass stems covered it, and a daisy served as a marker. Only the yellow margins of those young gapes betrayed the contents of that bird-made cup, filled with a down that matched the yellow clay to a tailor's nicety.

What personality has a bird! The female, on a later day, greeted me with an anxious "pseet" and fluttered back and forth above my head, giving me the sensation that she was about to alight upon my hat. She did alight, but upon the ground five or six feet away, there to protest the sacrilege. Her near approach to me was in direct proportion to my approach to the nest; yet when I sat quietly upon a mound some fifty feet away her suspicion was not allayed. In the grass about me she searched for food, making the circuit around and around within a radius of thirty feet of me, though the nest was fifty or more away. Temporary confidence was quickly forgotten upon my least movement, for she then

IT'S BROODING TIME
And five dappled bluish-gray eggs lay in the cup fringed with grass and well hidden

A PROUD MOTHER
She fed her young twenty-five times in a two hour period, despite fearful man's proximity

came fluttering in from a wider circle to set her surveillance at closer range. If I were quiet she forgot to protest and worked industriously there almost within reach. To the nest she went with hesitancy, doubting the advisability of feeding with so alarming an object near to follow her movements. Having fed her brood, she came back again to me, walking around and about, ever-watchful,—self-constituted Lilliputian guard to a great Gulliver ogre.

What a contrast the male! He wasted no time in calls or dalliance, but walked serenely to the nest, fed the young, whetted his bill on the hard-baked clay and went calmly away for more food. In a moment he would be back to alight on the mound near me with bright throat up and horns aloft in momentary mild curiosity. Satisfied, he walked by me in undeviating march of duty to his offspring. So calm a parent I had never met before. He didn't seem to know fear.

That day I pondered the thing called instinct. Here were two birds expending all their daytime energy in expiation of the "parental" response. To the male it meant a relentless urge to supply food, food, to a nest of clamoring young. Fear for their safety bothered him scarcely at all.

To the female the parental instinct was a reaction involving many greater things. Fear, solicitude for her treasures came first; the necessity for food was in complete abeyance when that was strong. She responded to this fear for her young by exhibiting two devices, both of which were calculated to remove the object feared. When an object, which might endanger her young, *had* found them, she exerted all her wiles to attract that object away, not by a simulation of accident, broken wings or distress, as do many birds, but by a brave and foolhardy fluttering about the very ear of the intruder. When an object was near which *might* find the nest she was the last to approach it; then the concealing part of her parental instinct predominated and inhibited all else. So it was that the male carried food many times to the female's once, while I was near. At first, I scorned the female; later I admired her instinctive method. And later, when I went to quietly sit and watch in the early dawn, and acted like a bit of landscape, she accepted me as such, hardly called during the hours I watched, and went busily to work, putting the male to shame in her efforts to feed her children. Twenty-five times those youngsters were fed in two hours!

A day or two following the nestling down was shed for the mottled gray of the sprouting juvenile plumage and a morning thereafter found the nest empty save for one retarded youngster who retained ragged patches of his first down. Promptly I named him the "Runt" and sat down nearby to contemplate the problems presented by one bird in a nest where previously there had been five.

"A WORM, PLEASE"
Only the yellow margin of these young gapes reveal the pretty bird-made cup

The Runt himself I had not solved though preceding days had shown him to me, his changing color not keeping pace with the remainder of the nest fraternity. He should have hatched with them and certainly that marvellous instinct of parent birds, shown by Herrick, wherein the swallowing reaction determines whether the food newly dropped into an open maw shall reside there or go to a brother with more rapid reaction—surely that instinct should have kept him well fed. The Runt did not lack in vigor and apparently not in appetite for he leaped up the highest when I whistled and my glasses showed him the most frequently supplied. But still there was the Runt, and somewhere thereabouts were four of his fraternity. I set out to find their hiding places.

The male parent shortly pointed one out to me, but to my shame I should never have found the youngster if my toe had not touched him and so set him on his feet and squalling down an old wheel rut. The mottled plumage of the juvenile presented a picture-pattern that was part and parcel of the bare, hard clay upon which the bird had squatted motionless,—a life-saving color scheme, for the young are helpless, and should stay in the nest until they can fly. Instinct held him glued to the spot until touch proved him discovered, then the only hope lay in loud appeals to the parent. The return to that crouch-concealment did not come while I was by and apparently never would come unless the young bird was left for a moment with parent consolement and instinct-advice.

In one other matter the larks left me in a quandary, in that the parent birds walked, one foot planted ever sedately before the other, whereas the infants hopped, and long study showed that walking came only after many days and by degrees. One cannot doubt that walking is the best method in threading meadow verdure, but the hopping plebeian ancestry of the larks cropped out in the young and pointed to an incongruous family skeleton here in a proud and princely bird. Pondering these things I returned to the Runt and the most amazing experience of the nesting.

To the mother bird my presence was always irritating and a cause for suspicion. Four of her charges were away from my bothersome presence, following the secretive instinct of their inheritance. There remained but the Runt. To him she came once or twice, cautiously, feeding. Each time the Runt jumped to the edge of the nest in ecstasy to tumble back in when she left. The third time she approached the nest with a living mouthful, reached a point near its brim and stopped. The Runt leaped up and out. The mother turned quickly and walked six inches away. Disappointed, the youngster tumbled back into the nest. The game was new, the action incomprehensible. Again the mother approached. Again the baby leaped out to tumble back when the mouthful turned and retreated. Yet a third time the mother repeated this movement, and this time the Runt stayed out. With low "pseets" the female slipped away through the grass and exuberantly, the Runt hopped after. In five minutes the twain were fifty feet away, for once the nest ties are broken there is never retreat thereafter. What an advent this: an Alice coaxed into a wonderland where hop toads are the walruses, cottontails the unicorns and field mice the only lions.

Just then, however, the male lark came in just near, to watch proceedings. He marched sedately up to his offspring, gazed at him calmly a moment, fed him and then walked to the nearby nest. The Runt followed. Into the nest the parent bird stepped, squatted there a moment and stepped out again. The Runt took the cue and tumbled in. Well satisfied, the male watched him serenely for a moment and then lifted on wing to a silent farewell. The child was home where he surely belonged.

The mother came back shortly and for one last time she lured the Runt away, easier now because of his earlier training. Through the grass the twain glided, one walking and leading, one hopping and tumbling behind. A low "pseet" came now and then to my ears. At fifty feet they reappeared, fast leaving me, an object which, to a father bird, had been only a vague and indefinite cause for alarm not to be confused with the blessings of home and the duty of food, but an object which, to a mother heart, had urged the breaking of last home ties that safety, far more important than home and food, might be secured for the last and the weakest of her brood.

THE SEPTEMBER ISSUE

The September issue will mark the passing of the dog days and the coming of the cool beauty of fall by recalling old favorites to its pages. R. Bruce Horsfall has painted an antelope frontispiece, which illustrates William L. Finley's "Riding the Rim Rocks", an interesting story of this fleet mammal. Mr. Haweis has another South African tale—"Like the Rhinoceros, Walk Alone"—last of this series of fascinating tales. Mr. Sprunt writes the third of his articles on American birds that have passed, this time the Carolina paroquet being the subject. "Flying Cafeterias" is contributed by the author of "Bird Bartenders", W. L. McAtee; and Paul Allen discloses "The Tragedy of the Little Brook". Frank Knowlton has revealed some of the intimate secrets of the water ouzel. "Agate Gems", by Earl V. Shannon, and "Evergreens and Your Home", by C. F. Brockman, are just two of the others. Mrs. Horsfall has chosen six species of bears for her regular animal sketches, and Dr. Palmer has reviewed the rich life of Louis Agassiz Fuertes, late illustrator par excellence.

Another brilliant story from the author of "Friendly Enemies" and "Denizens of Cracks and Dark Corners". It wings along like a swarm in flight

BUSY BEE!
This food-gatherer has become entangled in a milkweed flower, and has torn his wings in futile struggle
CORNELIA CLARKE

A BEE LINE

Inside and Outside Dope on Our Domestic Insect

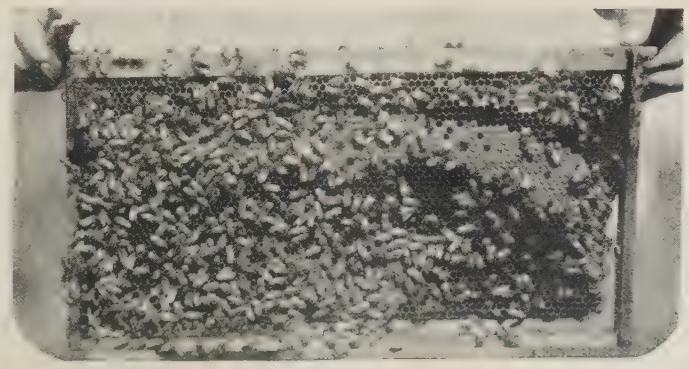
by A. B. Champlain

How many persons can recall the scientific name of the honey bee? If you can, stop here—for you probably know the rest. At any rate honey bees, like the Wise Men, originally came from the East, and from there have been introduced to and into nearly all the communities of the world. The outstanding result of their social life and culture is a "buy" word among epicures, and their products are prized in every land. In addition to this superficial popularity, it is generally supposed that honey bees have an extremely happy life. But,—there are some simple happenings concerning them, such as murders, robberies and conspiracies, not to mention duties, diversions and disappointments, that never get bruited about. All this notwithstanding the thousands of volumes in fine print that have been written concerning them. If you have never had the opportunity or moral support necessary to investigate bees closely, many of these facts, gained from first, second, third or fourth hand, etc., may be of interest.

The Four Hundred have nothing on the honey bees for social exclusiveness. Nevertheless certain charitable persons, the keepers of the bees, are continuously devising means for their moral and physical improvement and culture. Keepers are also assiduously trying to find out how many different ways bees can be robbed without their getting wise to it, and how they can be inveigled into working overtime. This the beekeepers accomplish by means of all manner of complicated paraphernalia that they get from some mail order firm, and a book of instructions that comes with every set. They wear a veil for protection that would do credit to any blushing bride, and take various and sometimes peculiar "steps" to intimidate the little apian creatures with the hot tails.

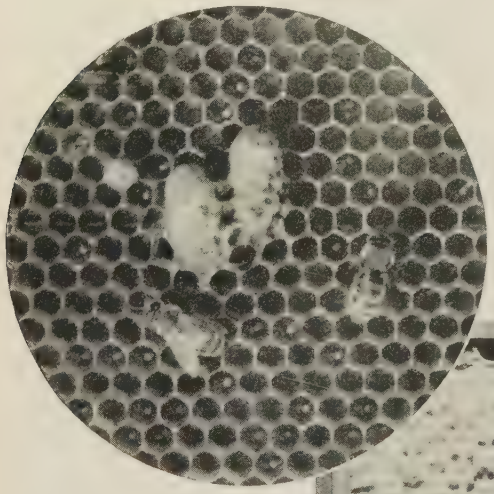
Some persons contend that they are immune to bee stings, but we imagine that it is only those with an exceptionally thick and leathery epidermis. There is a method of subduing bees, however, and I am going to divulge it to you. If you should ever, on account of a personal grudge, or for business reasons, want to get the better of a bee, just sneak up on it, or the colony, with a smoke screen. Never will you see bees more embarrassed than when under a barrage of smoke. You may then insult them, handle or rob them, and they can

A TYPICAL FRAME
Here are the workers, building cells, gathering pollen for "bee-bread", or storing honey against the winter



do nothing but tremble with rage and mortification. Late models in smokers consist of a can with a spout and a bellows attached. See book of instructions.

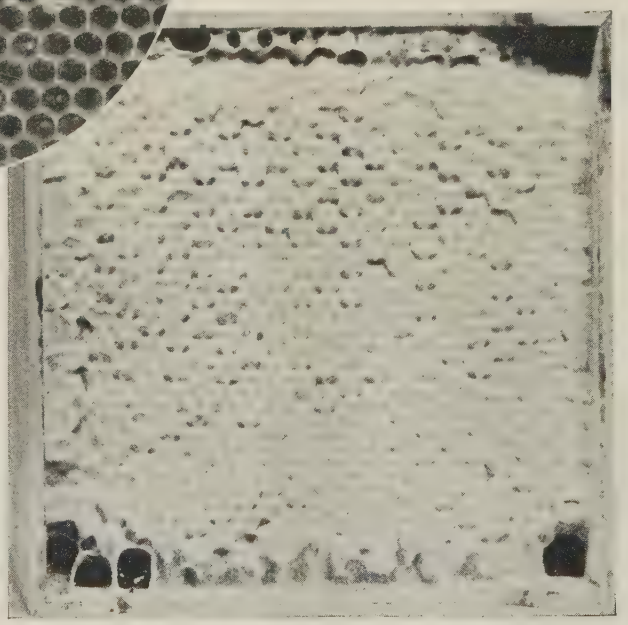
So much for the introduction; now we will go into the more scientific matter of Apian Monarchies. Like the human species, several races of domestic bees have arisen since the beginning. Among them we find the striped or dark race, the amber or golden race, and the black race. Just to show you the difference in some of them,—we find a more or less gentle race, a less gentle race, and a much more less gentle race. You can draw your own conclusions as to those best to handle.



THE COMPLETED HIVE

The keeper wins. Insert shows the extra large queen cells. Queens alone reproduce, laying eggs for new queens, workers and drones. Workers feed her children

FRANK C. PELLETT



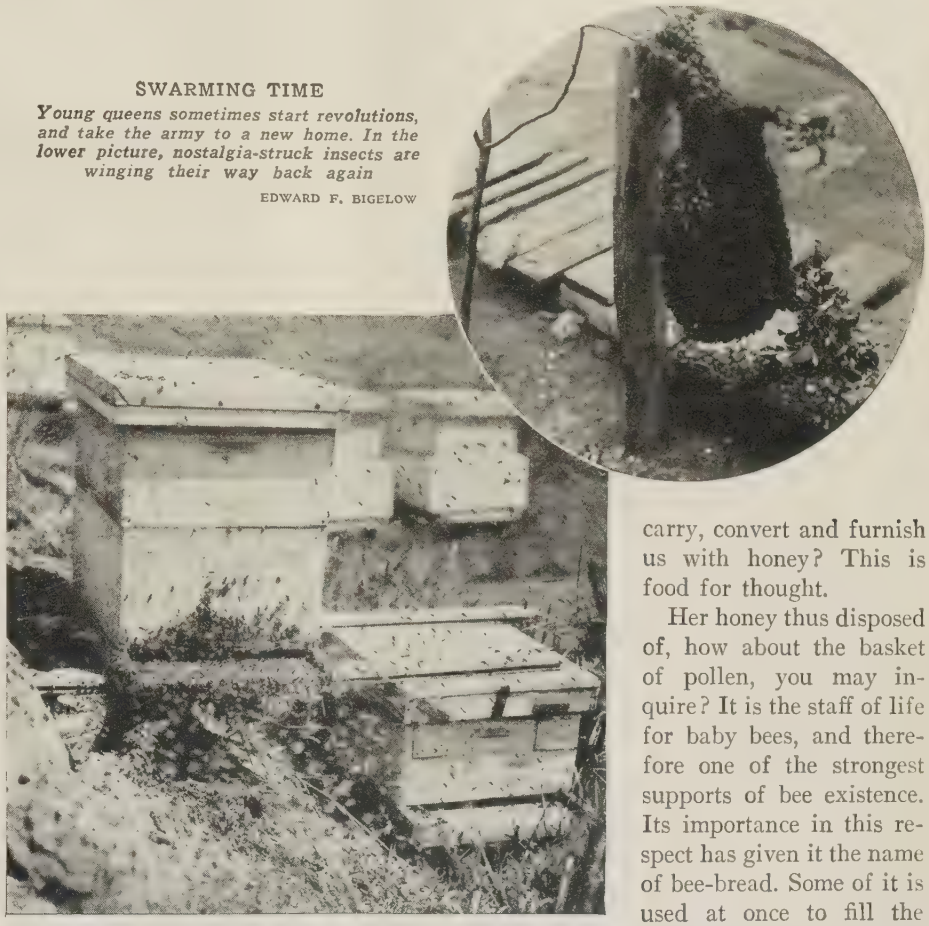
A bee's modern dwelling or hive is equipped with all the latest bee conveniences—for the keeper. But the bee doesn't know this. Here we have a social society, consisting of a Royal Monarch, the Queen, who under normal conditions is the only fertile female, and the mother of every individual in the colony. Just think of it! Then—a few hundred, more or less, of males or drone bees, luxurious dependent lords whose very name is the proverbial expression of idleness and insignificance, who are tolerated only as a necessary evil and got rid of as soon as possible. Distinguished from these active idlers the remainder—the remaining forty-nine thousand, seven hundred ninety-nine or thereabouts—are the infertile females, the active spinster workers, who are everything that their name implies. The sisterhood of busy bees.

The queen of the hive is a great personage and too aristocratic to soil her royal claws with any menial occupation; but when it comes to reproduction, she is in a class by herself. Her only business in life is to people her realm by supplying a sufficient quantity of eggs to keep the "incubators" going, and this is the character of her authority and the only bond by which she holds the devoted homage of her subjects. This dignified mother has peculiar instincts of motherhood, as we see it. The infant bees receive no token of love or affection from their royal parent, nor any other attention except their introduction into the world. Indeed it can scarcely be expected of her when a total of six thousand offspring are born within the compass of one day during the height of the season. Any mother might well be exonerated from distributing maternal affection in a case of surpassing productiveness like this. As head parent of a nation which in full strength comprises ten thousand individuals in winter and fifty thousand or more in summer, she relinquishes to the workers, the sole nursemaids of the colony, the welfare of her offspring. To say the least, this pampered individual has a comfortable and easy existence that well becomes her exalted station. She reigns paramount through life, is tended and fed to the queen's taste, and sometimes lives to attain the ripe old age of three or four years.

While we are hanging around, still at the threshold, and before we have snooped into the private secrets of the hive, we will watch the big parade. A steady stream of busy bees are passing in and out—those toiling for the sheer love of that pastime that we "slangily" call work, and a lazy, thieving drone or two, having been driven out by some irate lady-in-waiting to Her Majesty. While on the front porch, delegations in little groups or in twos and threes are clustered about in apparent deep discussions. Ah, little bees! is it the long working hours without pay—a labor union in the incipient stage; or is it the weighty political matters of a monarchy? Perhaps it is only the master builders, plumbers, wax-workers and artificers, the head nurses and chief-of-police who are conferring on the problems of the day. We must remember that it takes the closest teamwork and cooperation to keep things in shape for hard times, the winter months, and to furnish the surplus charged as rent by their landlord, the bee-keeper. Bustle and buzz, little bees! Labor incessantly from morn 'til evening during the springtime; it is your time of harvest. You seem busied with all the cares and labors of your kind except maternity—and sometimes even that. You are hustlers. During the warmer weather, if you get out when the whistle blows at "four" in the morning, you may "knock off" at ten a. m. and call it a day.

Where is the busy bee going as it "hops off' à la Lindbergh on its uncharted way, sometimes for great

distances? To rob the trees and plants of their sweetest treasures? We see her as she unfolds her tongue and draws in, with seeming greediness, the nectar of the flowers. We might also suspect that she was quaffing her luscious draught in selfish enjoyment. Neither one nor the other; and we would grievously misjudge her if we held such opinions as these. Her enterprise is in itself highly laudable. To many of the plants that she has plundered a service has been rendered. It is a method that Dame Nature has devised, with her usual clever foresight, to provide for the cross-fertilization of flowers. She has made the bee "the goat". Our bee goes her way, brushing pollen from the ripe anthers of the flowers into her pollen basket and incidentally carrying pollen from the stamens of one plant to the stigma of another, thus insuring the production of fruits and seeds. Just another way of proving that you never get something for nothing.



SWARMING TIME

Young queens sometimes start revolutions, and take the army to a new home. In the lower picture, nostalgia-struck insects are winging their way back again

EDWARD F. BIGELOW

After the pollen baskets, —which she gracefully carries, one on each hind leg,—are filled by clever manipulations that would do credit to any high class acrobat, and her "tank" pumped full of nectared juices, she is off again. She cuts the air like a miniature mail plane, laden with precious cargo, and makes the proverbial bee-line for home. Like a good pilot, she knows the exact direction of the hive and drops onto the landing field with easy confidence. How is her unerring flight directed? No compass; no map. What is her guide? Who can say? She has disappeared into the hive leaving us with a question unanswered.

Let us investigate for a moment the community life of the insect. We will do this by the long distance method, as the bees may become peeved if we are too curious and try to open up their home. Bees may have their trials and tragedies but they will also have their little joke. If we cannot always see the "point" we may be otherwise impressed by it. So we read that a bee-hive is full of an infinite number of things besides wax and honey. It contains parables, precepts, patterns, poetry and population. The population is made up of the ova or eggs; the larvae, grubs or baby bees; the pupae or insects in the resting stage; and the imagoes or winged adults of the two sexes and three types mentioned.

Now this is good: our bee, as before mentioned, but not disrespectfully, was carrying a double load as she entered the hive,—orange pollen in her market basket and nectar in her honey-bag. But neither of these delicacies was intended for herself. She is no selfish, small-hearted individual. In the first place she dutifully gives her queen a nip of her honey. The remainder, all at least excepting the trifling "snack" required for her own support, she then places in the pantry or storage cells, and when anyone wants a drink he just helps himself. Or she may share it with a gang of hungry or thirsty laborers, who by dint of much leg-work and jaw-work are making alterations, or are employed in building new cells. Did you ever stop to think of the marvellous "in and out" processes that the bees use to carry, convert and furnish us with honey? This is food for thought.

Her honey thus disposed of, how about the basket of pollen, you may inquire? It is the staff of life for baby bees, and therefore one of the strongest supports of bee existence. Its importance in this respect has given it the name of bee-bread. Some of it is used at once to fill the mouths of the infant occupants of the nursery cells, or if more has been prepared than for immediate needs this also is preserved in the store-rooms for the future.

Then we have the question of bees-wax, the essential for the six-sided cells used in combination to form the comb,—otherwise the storage and brood cells, the latter to cradle the baby bees. Think of the apparent depth of a bee's mathematical mind and the manner or cause in which she is led to this geometrical end for the construction of these cells. The worst part of it is, there is no way of finding out. It's nobody's business anyway, and I for one am not going to pry into it. We find that honey and sugar, sucked, digested and chemically changed by the bees in their internal laboratory, are to a great extent transformed into wax. This appears as a finished product in the secretions which are exuded from the rings of the bee's stomach, and is sometimes visible

in the form of wax scales. All this and a lot more do we find in this great establishment of industry; but mainly a busy camp of amazon workers helping to make the world a better and sweeter place in which to live. What more has life to offer?

We would find that after all, the lowly, common folks are the real rulers in the hive and that our Apian Monarchy has literally and figuratively the odor of a democracy. The workers determine how many young bees should be raised during the season and demonstrate the practicability of birth control. They build the needed number of brood cells in three sizes, each to fit the future occupant. The smaller ones are intended for spinster workers, the larger to contain drones, while a very few great ones, plastered upon the sides of the comb, are intended for future queens. Thus we learn that the birth chambers of the queens, as compared with those of the working class, are of right royal dimensions; they are vertical in position, cylindrical and somewhat cone-shaped, and often contain the excuse for a political upheaval.

CORNELIA CLARKE

LOADED UP

Not for nothing does the bee get nectar. It is laden with pollen grains, designed for other flowers

The queen mother lays an egg in each of the brood cells and never makes a mistake in its character. She lays drone eggs in the drone cells, worker eggs in the smaller cells, while in the queen cells fully developed females are raised,—for the queen of the bees, no better than her more ordinary sisters, issues from the egg, a helpless baby bee or grub. It is believed that the eggs producing drones are not fertilized, thus their laziness.

The larvae, grubs or baby bees, whichever way you may wish to designate them, upon hatching from the eggs are carefully fed by the worker nursemaids, and each variety receives a different kind of food. They go through their infant life drearily eating bee-bread, helpless and dumb. The future queens live on a specially prepared delicacy,—that rare vegetable essence or "royal jelly" supposed to be rich in nitrogenous matter and not the simple bee-bread composed of common pollen. When the grubs are full grown the cells are closed or capped by the workers and the pupal or resting stage of the bees is formed behind these closed doors, between silken coverlets. In due time the winged adults issue, either drones or workers. In the former case they idle about with their hands in their pockets, literal sons of rest with nothing to do except find food for themselves. But you can hardly blame them. The workers at once assume their full share of the duties of the hive, gathering honey or pollen, or attending to the general business of the hive. They are patriotic, patient and skillful, and though seldom mothers themselves, they seem to be endowed with motherly instincts. The most surprising thing about them is that they live perhaps less than a whole year,—bee-keepers say only an average of three months during the height of the season,—and accomplish so much. Thus it appears that after all bees have hard, short lives and the great problem that takes nearly every hour and every minute is nourishment. Any pause might be fatal with so many mouths to feed.

Of course the continuous increases in the family sometimes overcrowd the hive and then the question arises, are there any more houses for rent? Meanwhile new queens are growing up and now the old ruler of the hive becomes uneasy and feels herself slipping. She does her best to get at the queen cells and is equal, like Lucrezia Borgia, to using the dagger or poison on her maturing rivals. If the worker "Committee of Safety" decides that secession is in order, and is framing plans to swarm, the aged monarch is prevented from doing this mischief. The workers gather around the queen cells, after talking it over behind Her Majesty's back, and simply block her way. When the new females emerge from their chambers, full-fledged queens, every effort is made to prevent a meeting between youth and age, or even a "get-together" of young queens—for it would precipitate a "free-for-all" among these royal personages that could end only in the death of the weaker. One or the other would receive the fatal thrust of poisoned death, the sting of the queen bee. Only on occasions like this will a queen try to sting, and she would scorn to use this weapon of hers on any but a royal rival.

EDWARD F. BIGELOW

THEORY AND PRACTICE

The bees have swarmed just above the bee books. Perhaps they wish to see what humans say of them

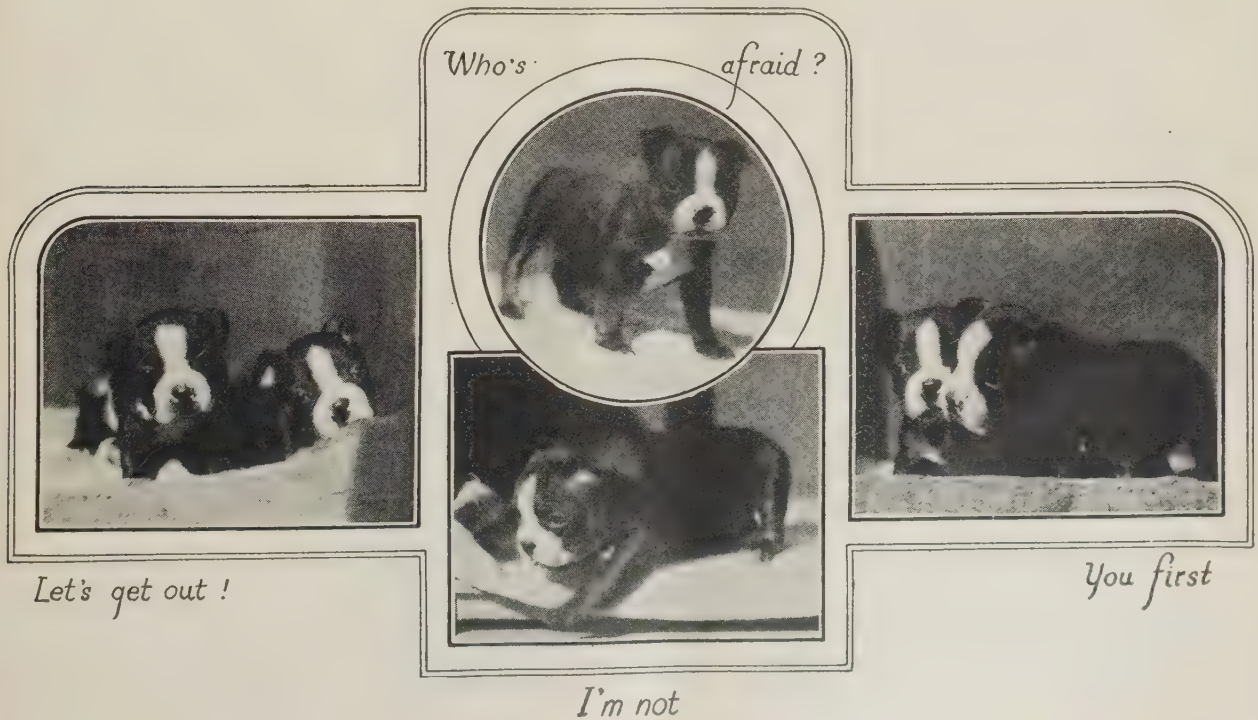
And now comes the really wonderful part of

the romance, for we are going to observe a young queen as she chooses her royal partner. When from four to five days old, if the weather permits,—that is, if it is a nice day and isn't raining,—a young queen ventures from the hive. Resplendent in the bridal costume, a golden-ringed body, with her somewhat abbreviated gauzy wings, she is conspicuous in her majesty of size as compared with her more mediocre subjects. Timidly at first, but soon with confidence, she circles away into the sunlight; and after her go all the available drones or males. Investigating these intimacies of bee life,—questionable taste on our part, but scientifically necessary,—we are impressed with the eagerness with which the drones try to force their attentions upon the queen with matrimony as their object. They do not seem to realize that the joke is on them, and for all the joyousness of the occasion it is a little sad too. For in spite of being only an insect, a drone has his weaknesses after all. Some bolder fellows may overstep the niceties of courtship and crowd a bit, but as the sky is the limit and the mating is carried on out in the air at all times, there is still plenty of room according to the size of the atmosphere. If you stand on the hive and try to watch this interesting affair you will only get a stiff neck for your trouble. The astonishing thing about a bee's courtship is its peculiar climax. Only one drone is finally accepted and he loses his life for his temerity. Thus, little creature, does your romance end. No less tragic, however, is it than the fate that awaits your brethren. It is the signal for a general massacre of drones and the hive is thus rid of all useless and superfluous individuals. Reasonable, too, for mating usually occurs but once during the life of a queen. She goes back into the hive and never leaves it again, except with a swarm.

Let us suppose for the sake of convenience that a swarm is in progress. The bees are uneasy, their morale is shattered, they cease work and eat up a lot of stores. From the unusual sounds, murmurs and applause (stamping of feet?), they appear to be holding a political mass meeting. Evidences of confusion are apparent; crowding and shoving causes a ferment that bubbles up into something unusual and trouble starts right away. A considerable portion of the colony, apparently non-union members, leave the hive. They are under the leadership of the old or a new queen and the swarm is in action. Milling about in the air for a while, the bees then fly for a longer or shorter distance until they get tired. At last, worn out by these unusual exertions, they stagger to some convenient "bough" and settle down in a solid mass, usually surrounding the queen. They might be fairly comfortable here provided it didn't rain, but finally a new residence is selected,—or is prepared by the bee-keeper.

Here you will note again the same absurdity; the queen thinks she is the boss of the hive, instead of the keeper of the bees, and she enters her new home. Following after her, like the obedient subjects that they are, the workers trail along. Work is again started; the busy hum denotes the artificers on the job,—wax-workers, comb-builders, honey-gatherers,—the new colony is in full swing. Soon they will have everything from the weather stripping along the cracks to the nifty replica of the old wax-work exhibit to fill with eggs or honey.

Now we know how wonderfully Dame Nature takes care of all the little bees, aided only by the bee-keepers, who are constantly trying to improve on her. And we can sympathize with Nature, too; she has so many things to think of, it is a wonder she doesn't make more mistakes. I wish that there was more space to elaborate on this matter, for I have really only just begun, and all that I have said so far has been a secret heretofore—an open secret. At any rate you will find the scientific name of the honey bee in any dictionary or encyclopedia, and most likely a lot of general bee information besides.



FOR A NUMBER OF NIGHTS HE VISITED THE TRAP

FISI

The Hyæna Who Sleeps All Day and Dreams

by Stephen Haweis

Illustrated by the Author

THE Wagogo say that Fisi, the hyæna, sleeps all day and dreams of the lion's kill. Every creature which dies in the bush before sunset comes into his dream also. He sees it all so clearly that he has no trouble in finding the bodies in the dark, but the creature must die before he wakes up, otherwise he cannot dream about it. If it dies just after he has awakened the body lies in the bush all night and all the next day untouched; he cannot find it. But Fisi will certainly dream about it, and eat it on the following night. Similarly with a trap. It must be set after dark, when the hyæna is awake, otherwise it will come into his dream and nothing will induce him to enter it because he will know all about it. But, armed with this knowledge, it is easy for us to set a trap properly and with a little luck one may catch a hyæna.

Our trap was set under a tree and the string which held the trap key was stretched over a lower bough. A goat's head which had long ceased to be of use to any goat, a head moreover which cried aloud for burial, was instead dragged about from several directions towards the trap door. Then it was tied to a cross piece of wood behind the key inside. So keen is the hyæna's scent that he will be able to follow a trail like that through dry sand and dust for many hours afterwards as easily as one might follow a chalked line. For a number of nights in succession a hyæna visited the trap and looked longingly at the goat's head inside, but he was afraid to go in. But, at last, finding that nothing happened to it night after night and nothing happened to him for looking, he threw caution to the wind, and was caught.

Fisi didn't like the trap from the inside any better than he had liked its looks from the outside on the first day. He didn't like the noisy boys who pushed the trap home on a push cart. All the way home they sang: "*Ho, Ho, risasi, Wewe sange, jambe, . . lantue, Sangeve aha ewa, mtue, mtue, Wanesanga berlo, mtue, mtue*". All of which means, "He's got a bullet in his head, and he is dead beyond question", which was neither true nor amusing.

But most of all Fisi hated to find himself outwitted; he was ashamed of being there. His low, continual growl was not so much directed against the human animals who peered through the bars and exclaimed, "Oh, isn't he a large one", as against himself and his own stupidity. His growling meant discontent with himself: there is nothing so unpleasant as finding out what a fool one has been,—and perhaps is. It was monotonous to hear the comments of visitors, but that was the least of his troubles. Fancy having supposed for one moment that a perfectly good goat's head could have been forgotten by the butchers and left alone by everyone else for a week unless there was a catch to it somewhere! He knew now where the catch was, and ought to have known before, but it is easy to be wise too late.

Towards nightfall the first real terrors came upon him. To be enclosed, not to be able to run along silver paths in silver glades; to see the stars only between stripes of iron; to be able to smell only so much of the night itself as could squeeze itself through prison bars . . . but his greatest fear,

KEEN OF SCENT, FISI CAN FOLLOW A TRAIL LONG DEAD FOR SOME OF HIS WILD FELLOWS

With this drama of Africa, the series of articles by Stephen Haweis, based on the Smithsonian-Chrysler Expedition experiences, nears its conclusion. The last article will be published in the September issue. Mr. Haweis' individual style of writing, his restrained and therefore delightful humor and his intimate understanding of the animal mind have combined to make this series notable and to arouse much comment. We are happy to assure our members that the conclusion of this series will not mean the disappearance of Mr. Haweis' name from our pages. Recently returned from Hawaii, he has contributed some new articles of most delightful character.

apart from the discomfort and humiliation of being a captive, was the thought that nothing succulently dead and eatable could possibly get in for him. The Fisi can eat almost any kind of carrion, skin, bones and all, things that most animals would reject in disgust, but eat he must. Here, he supposed, he would certainly starve to death. He feigned sleep all day, perhaps, too, he did sleep a little as the slow hours went by. It was dark when the silence awoke him and a smell of fresh meat filled his nostrils. Sniff! Fresh meat, of course, without a doubt. But how did it get there? He had no recollection of it, but there it was. In two gulps it became a satisfactory memory. Not every day did he taste food as good as that. He seldom got anything better than hoofs and horns with a shred of skin attached. But meat . . . wow, it was good! And water too. Not much but just enough in a small metal pond . . . just enough for once, but how could it be refilled? No doubt it was the last drink he would ever get. Good dinner though . . .

Then the long night. He heard the plover whistling as they ran and flew to and fro between the thorn scrub and the euphorbia bushes, he heard the scrape of the owl's claws upon the corrugated iron roof of the house behind him. The jackal shot past in the direction of the slaughterhouse. Sometimes, he knew, a scrap or two would be found there, left by those who carried the offal to the burning stove or to the pits where other refuse is buried. Then he heard the hunting call of a hyæna, too far off to recognise whether it were friend or stranger, but the sound stirred him to a wild energy, to digging on the floor of the zinc-lined cage, to scratching at the zinc-lined walls, to gnawing vainly at the iron bars which never moved nor shuddered at his utmost efforts. The adamant-ware enamelled basin in which the water had been was dry: that at least he could make some impression upon. He held it in his mouth and smashed it against the bars. In an hour he had crushed it into a twisted mass of scrap iron, bitten clean through in several places, but it did not help in his battle for freedom. A shadow and a whine made him shoot to the front of his cage with such speed that he thought his nose was broken. It was his friend.

"Help—yelp, for the love of Bones, help me", he whined through the bars. "There is nothing inside upon which to begin to bite, . . isn't there a loose piece anywhere? My nails are sore and aching and I have not succeeded in accomplishing anything at all"!

"It's a trap—", said the other.

"Of course it's a trap, but there was a way in, there must be a way out. Come near and try".

"I dare not . . . it is a trap. How do I know its hunger has been satisfied by you; it may spring at me also".

"What news at least of my cub, and of my mate? Where are they and why do they not come"?

"Dame Fisi,—peace and respect be to every hair and shade of her,—is well, and the cub is well also. They dare not come to you, and her duty, she says, is to the cub first. It is the law".

"True, but she might leave him for an hour"!

* * *

Three men were shivering in pajamas at the door of the house. It was just invisible from where the cages stood but they peeped out, one by one.

"Can you see it"? whispered the hindmost.

"Yes, it is sitting about fifteen yards from the cage, and every time it yelps, ours scrabbles to get out".

"They're making a deuce of a racket. I've half a mind to put a bullet . . ."

FISI'S FRIEND CAME TO THE DOOR OF THE CAGE TO CONVERSE AND TO CHALLENGE HIM

"They're protected, as scavengers . . . hyænas . . ."

"Well, we are to get some sleep, aren't we"?

"The law says nothing about that, so far as I know".

"Well, fling as large a stone as the law allows at the beast and let us get back to bed".

But the hyæna was well out of range before the man had found a suitable missile: Fisi can sense a hostile intention more quickly than it can be expressed. On the following night his friend came again. But though there was much whining and scratching there was considerably less of it than on the first visitation. There was progressively less, and two of the men no longer lost their beauty sleep. Those two however could not speak or understand hyæna talk; their Swahili also was beneath contempt. The one who understood a little went away on safari, hunting and camping day after day, searching for anything which could be taught to live in a cage. When he had returned to the base camp for a few days he was awakened by some angry talk from the Fisi's cage.

"If I ever do get out of this trap, and I will,—I will rip both forelegs from your carcass before I break your neck . . ."

"You never will get out,—nobody ever gets out of a trap. And if she cares for me, can I help it? I never said a word to her while you were free. But I want her now, and you, . . . what can you do? I'll fight you for her,—if you can get out".

"Yes, you'll fight . . . if I have to chase you till you die of exhaustion. Now go . . ."!

"When I get ready", replied the other, sniffing a little closer but without advancing a step.

"You'll go NOW"!

And, by that nameless, amazing power which seems to accompany a strong character and a resolute mind, our prisoner compelled his former friend to withdraw. He waited until he had gone nearly a hundred yards before he gave the whinnying hunting call of the hyæna tribe. Nor could he make up his mind to go away altogether; he had something on his traitorous mind, but he did not dare to come back.

It was bright moonlight; there was no difficulty in seeing objects for a hundred yards among the tufts of shrub and thorn. Another animal trotted towards the cages, followed by yet another, much smaller, almost like a jackal but not similar. Dame Fisi lay down less than fifteen feet from her caged mate while the cub trotted nervously to and fro, sometimes sitting down with one paw raised but getting up again at once, whining. He had learned to hide when his father was angry or hungry. He was certainly angry now. His mother had never answered nor taken any notice of her lord's words until he was well fed; threats or abuse or boasting was all one bone, and little meat upon it at that. But today her tongue lolled out between the series of wild screams to which she gave vent, meaning that she was quite prepared to answer argument with argument. She was incoherent but sure of herself and unafraid. She was hopeless of the trap and helpless,—alone in the world. Her mate was gone as surely as though he lay dead before her. She could not live in the bush unprotected. Things move quickly in the "blue". Another lover had taken the place of her imprisoned consort. She suffered to see him there and the night sky gave back a passion of screams which were not merely characteristic sounds of the hyæna tribe but the same cries which are the common language of thwarted passion in the mouth of a thousand different species, not excepting the lord of creation himself. Grief she had in plenty and she was not slow to give way to it, but sentimentality she had not. Her practical female nature needed a mate for company and protection. The simple nature does not argue introspectively and suffer in silence, it acts and cries out when hurt or happy. Dame Fisi was both at one and the same time; her cub was uncertain what to do, feeling the tension in the atmosphere and wishing that he had a bone to pass the time. For half an hour the interview continued through all the gamut of pleading, of passion, of anger, of threats and rage, but the bars between them never moved nor even shuddered momentarily. She never came again after that night.

Fisi lies asleep all day dreaming of the lion's kill and of animals which die in the bush. Every evening a piece of meat is thrown into the cage, a bowl of water is replenished by magic means. Fisi wakes to eat and drink,—those fears at least are over and daily he accustoms himself to the indolence of cage life and to hearing visitors exclaim upon his size. But, at night, when the Southern Cross shines into his cage he cannot help being reminded by the three stars of his mate, himself and his friend,—and by the little fourth star, somehow different from the others, as though more remote, of the cub which he will never see again. Then he whines piteously as he digs with both forefeet upon the smooth surface of galvanised iron behind the iron bars, which are silent and still unmoved between him and the future.

THIS IS *AMPHITHOË RUBRICATA*, WHO DWELLS IN A TUBE OF SILK

HIS SPINNING POWERS ALONE SAVE HIM FROM HIS MYRIADS OF ENEMIES

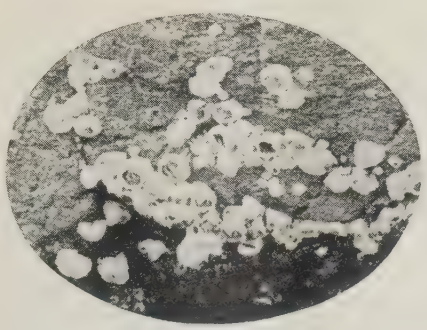
THE SPINNING CRUSTACEAN

In Tidal Pools He Builds His Silken Home

by Alexander F. Skutch

THE ARMY of spinners in the animal world is a motley one. There is the queen of spinners, the spider, whom the silkworm excels in quantity. There are the tent-caterpillars, who build in families, and the young ant larvæ, who secrete the silk they can make at the commands of their elders. But among the host there is one who is little known, who spins beneath the surface of waters shifting with the tide. This is the spinning crustacean, the dweller in a tube of silk.

He is an amphipod, known as *Amphithoë rubricata.* Most of his relative amphipods inhabit the sea, although some, such as the sand-flea, leave the water and swarm along the sandy shore. Some inhabit fresh-water streams and even wells; they have been found in a moist ravine near the top of a tropical mountain a mile and a half high. But *Amphithoë rubricata,* who, alas, owns no common name, always lives at the borderland of rock and water, on the edge of the North Atlantic and its arms, and would fall over on its side and be utterly helpless away from its element. And his only defense is the product of his body—his silk. He looks like the shrimp, in diminutive form; he has two pairs of antennæ, two pairs of "pincers", five of legs, and several of swimmerets. He is brown, and there is an attractive white spot near the posterior margin of each of the segments making up the hind part of his body. And the tidal pools which are twice flooded and twice uncovered by sea waters from the Bay of Fundy to Long Island Sound, from Norway to the Azores, form his only home.



BARNACLES

A neighbor of the weaver and likewise well armed for a hard life

Those who have spent a summer near the rock-bound shore of northern New England will remember the numerous pools which nestle among the inter-tidal rocks. They range in size from little water-filled pockets so small that they could be covered with a handkerchief, to ponds broad and deep enough to swim in. As we see them during a stroll along the rocks when the tide is near the ebb, each is a microcosm with a flora and a fauna all its own, but as the tide rises the waves pour into it, and it is again merged into the general life of the great ocean. Now it is a minute portion of the great ocean system of the globe, now a little, independent entity. Each pool is twice a day lost in the vastness of the sea, twice a day called back to individuality. From the ocean it receives an abundance of those elements which all living things require, while during the period of isolation it is exposed to the sunlight which is essential to all self-

supporting plants. Accordingly it is the seat of an abundant plant and animal life. At ebb tide one may look into the quiet waters of the pools and distinguish a rich variety of seaweeds of all forms and colors—green, brown, red, pink, purple, and even some almost black. Closer examination will reveal an equal variety of animal life. Amphipods and isopods dart among the plants, worms creep through the submersed branches, mussels and sea-urchins are attached to the rocks or the plants.

How do all of these organisms manage to persist in these pools when the enormous breakers are pounding into them while the tide is high? Along the exposed shores there is seldom a day even in summer when the breaking waves do not decorate the cliffs with a margin of white foam. Free-swimming animals cannot exist here. The plants are all firmly anchored to the rock-bottom of the pool by root-like "hold-fasts". The animals must be attached directly to the rocks, as the mussel by its strong byssi, or are dependent upon the plants for shelter.

The spinning crustacean is of the latter group, and has solved the problem of finding protection in an unique way. It builds a tubular dwelling for itself among the living seaweed, the walls bound together and lined with a silky thread which it secretes. The character of the nest varies considerably according to the kind of seaweed in which it is built. There is *Spongomorpha,* a green seaweed which covers large areas of the more shallow, sunny pools with a close-set sward. The thick, compact bundle of slender, branching filaments of which the plant is composed is penetrated by a tubular passage two inches or more in length, and about a quarter of an inch in diameter. The filaments surrounding the tube are bound together by the delicate strands of amphipod silk, which form a lubricous lining for the nest, and give firmness to the structure. The tube is open at both ends, and a keen observer, standing by the brink of the pool, may often discern the upper entrance of a tube in the middle of a green tuft. The amphipod builds differently in different plants.

HOME GROUNDS

It is in this tufted green seaweed, Spongomorpha hystrix, *that the spinner builds*

The amphipods are of a solitary disposition. Usually a single animal is found in each tube, occasionally a male and a female occupy a tube together, but almost never two of the same sex, and never more than two. Male and female alike build and occupy the tubes. The thread which binds together and lines the nest is as fine as the finest cobweb. The transparent strands measure only the twelve-thousandth of an inch in diameter.

How does the animal construct its nest? Fortunately *Amphithoë* works well in captivity, as the rock-pool is not a favorable place to observe such small details. As soon as the amphipods are liberated they swim up to any nearby seaweed and burrow in among its branches. Most of them work their way in so far that we can not observe their subsequent behavior, but occasionally one will begin to spin while it is near the outside of the tuft, covered by only a few filaments. The silk-secreting glands are situated in the first two pairs of legs, and open by pores at their tips. The animal plies these legs back and forth between the filaments with a steady, sustained motion resembling the playing of a piano. Before long, if we touch the filaments with a needle, we observe that they are bound together by unseen bonds. After working in one position for a time, the animal turns a somersault, or pivots sideways, so as to spin at another portion of the incipient tube. After twelve hours the tube has assumed a definite form. The layer of threads becomes so thick that the movements of the amphipod within the tube can not be seen clearly, but the

THE BORDERLAND

Where the tides ceaselessly range over rock and seaweed the spinning crustacean lives his short life

animal probably spins for several days before the lining of silk is completed.

When the nest is built in the *Spongomorpha* no other material is used in its construction. But the case is quite different when the amphipod supports its dwelling in the seaweed known as Irish moss. This plant forms flat, thick sheets of tissue, instead of the slender branches of the former. The animal supports its tube against the smooth, somewhat concave face of a branch. Where the tube is not in contact with the Irish moss, its wall is built up of a varied assemblage of material,—fragments of shell and bits of seaweed, bound together with a liberal supply of silk, which also lines the entire nest. The Irish moss plant bristles with the foreign material. The builder in this plant impresses one as a much more ingenious and skillful artisan than his brother in the *Spongomorpha,* who has only to burrow and to spin. However, if we take some animals from the green seaweed and place them in the red Irish moss, then sprinkle broken-up shells and shreds of sea-lettuce over the plants, we find, after a few days, that these amphipods have built nests resembling in every way those found in the Irish moss in the rock-pools. *Amphithoë* is a versatile builder.

BUSILY AT WORK

For several days he spins, now and then turning somersaults to build new defenses

Beneath the female are eight roundish flaps of skin, four on each side. These are bordered by long bristles, by the entanglement of which they are joined together to form a pouch. Here the female deposits her eggs, and from fifty to seventy-five amphipods hatch out and pass through the early stages of their lives. But when they are scarcely an eighth of an inch long, and still white and unpigmented, the young amphipods are cast upon their own resources. They settle down immediately to build tiny nests of their own, often clustered around the mouth of the maternal dwelling, like fumaroles around the crater of a volcano.

The principal food of *Amphithoë* is seaweed of various kinds, although when this is not abundant it partakes of animal food, and is not abstemious of its own kind. These amphipods are practically never seen swimming about in the rock-pools, and it seems probable that they do not leave their nests to forage, but eat such fragments of seaweeds as the waves waft within reach of the nest. This lacking, they partake of the seaweed in which the tube is built, or even the tube itself. The twisted strands of silk often found in their stomachs are evidence of this. In captivity, when sufficient food is not supplied, all of the seaweed surrounding the tube is eventually consumed. A bit of seaweed placed in the dish three inches from the mouth of the tube will be neglected for days, but if it is held in a forceps in front of the amphipod, the animal will dart forward and grasp it in his pincers, and hold on so tenaciously that the whole nest may be pulled around on the bottom of the bowl by the food. The animal never lets go of the nest in its forward lunge. Bits of wood and other inedible objects are grasped in the same way, but afterwards ejected from the tube. In the rock-pools, it is necessary first to shake the nest gently, as though it were rocked by the waves. Then the amphipod will often move up to the entrance and grasp the profferd morsel.

Amphipods which are destitute of the protection afforded by the nest live in the same rock-pools with *Amphithoë.* Compared with *Amphithoë,* which is relatively helpless outside of its nest, these amphipods are powerful swimmers. During high water they take refuge among the seaweed, to which they probably cling. The method followed by the *Amphithoë* is, then, only one of those by which it is possible for amphipods to maintain themselves in the teeth of the constantly pounding surf.

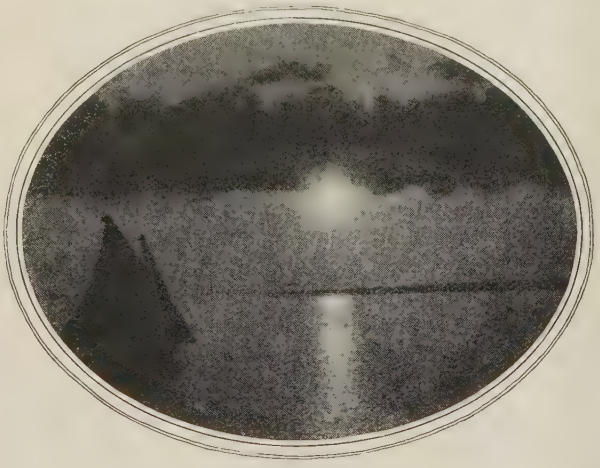
THE TIDAL POOLS

Here dwell myriad forms, not least of which is the little silk maker, secure and comfy in his retreat

FIRST PRIZE

Dinner-time

MRS. W. F. ELDRIDGE
Corona, California



THIRD PRIZE

At Sunset

G. CLARENCE FRANTZ
Germantown, Pa.

This is the last of the scheduled general outdoor photographic contests. Next month's contest will be devoted to pictures showing unsightly billboards, carelessly left picnic sites and other desecrations of the out-of-doors. The last contest will be the Garden Photographic Contest for the best garden photographs, closing on September first. This will give ample time to photograph the beauties of your home garden.

HONORABLE MENTION

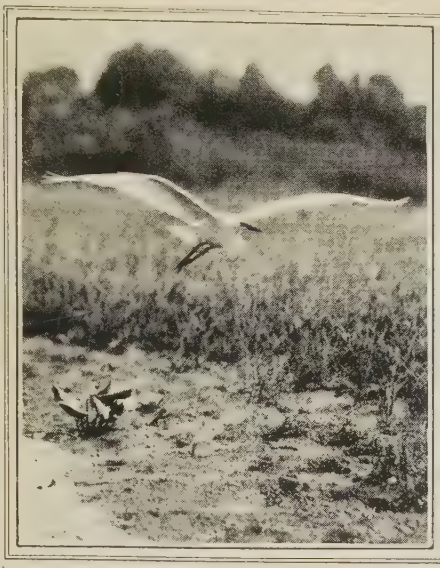
The Bend in the River

VANESSA DENTON Wellesley, Mass.

HONORABLE MENTION

Monterey Cypress

H. M. GRAHAM Pasadena, Cal.



THIRD PRIZE

American Egret

H. T. MIDDLETON
Hainesport, N. J.

SECOND PRIZE

Quail in Winter

HOWARD FOWLER
Rogers, Ark.

HONORABLE MENTION

Young Hummingbird

W. M. ROSEN
Ogden, Iowa

HONORABLE MENTION

Out on a Limb

C. H. BROWN
Edgewood, Md.

HONORABLE MENTION

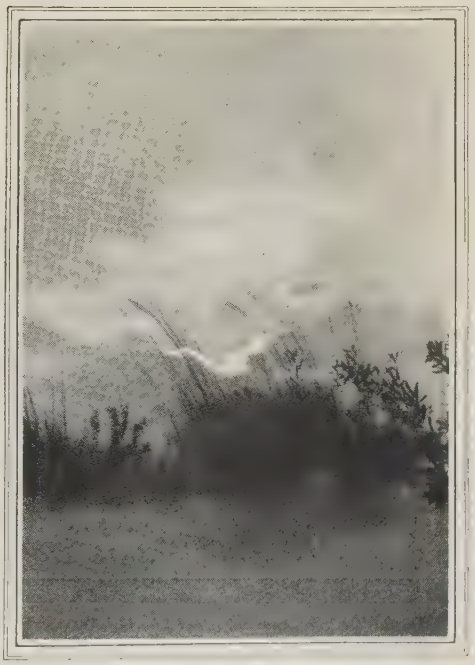
Young Sparrow Hawks

RALPH BALLARD
Niles, Mich.

THIRD PRIZE

A Dune Sunset

CLARA JACOBSON
Chicago, Ill.



KENTUCKY BLUEGRASS, MIXED WITH RED TOP, BROUGHT THIS LAWN INTO BEING

H. ARMSTRONG ROBERTS

YOUR

How You Can Make and Maintain It

By O.B. Fitts

IN THE general home landscape there is nothing that serves a more definite or important purpose than the lawn. In speaking of the lawn here, the term is meant to apply only to the turf or greensward. A good, well-kept greensward adds more to the beauty of the home landscape than any other factor. It serves first as a covering to hide the displeasing effect which is always present where the bare surface of the soil is exposed; and second, it forms a very pleasing background for ornamental trees, shrubs and flowers as well as formal gardens, walks and drives. It is possible to make a fairly attractive lawn without the use of trees or shrubs, but it is impossible to make an attractive lawn without turf.

Most everyone appreciates a good lawn, but unfortunately, very few seem to be able to make or keep one satisfactorily, and for this reason it is believed that a few suggestions concerning the problems commonly encountered in lawn making and maintenance will be helpful to anyone who is sufficiently interested to give them proper consideration.

A good lawn depends to a considerable degree upon a proper beginning—that is, proper preparation of the soil, the use of proper seeds, the proper time of sowing, and the proper methods of sowing. A good lawn rarely ever results from slip-shod methods in preparing the soil, selecting the seed or sowing the seed.

When contemplating building a lawn, one of the most important things to be considered is the time to plant the seed. If the lawn under consideration is located in the North or in the region where northern turf grasses are to be employed the work should be done in the late summer and fall, as August 15 to September 30 is the best time of year to sow the northern grass seed for lawn or other turf purposes. On the other hand where such southern grasses as Bermuda and carpet grass are used, spring seeding is desirable and should be done as soon as danger of frost is past. One reason for fall seeding in the North is that the cultivated northern turf grasses become well established by the following spring, when crab grass and other weeds are just making a start, thus giving the turf grasses an advantage over the weeds. This is highly desirable as it gives the turf grasses a hundred times better chance to withstand subsequent weed invasion, whereas if sown in the spring they start off even with the weeds, especially crab grass, to which in many cases they eventually succumb. On the other hand, however, spring or early summer is a good season to start preparing the lawn that is to be seeded in late summer. There is usually a great deal to do in preparing a good seed-bed, and ample time should be allowed. Sometimes a person may wish to sow a soil improvement crop in the spring, to be later turned under, thereby improving the soil for grass sowing. Soybeans or cowpeas are very satisfactory crops to grow for green manure. These may be seeded in early May and plowed under in late July or early August. Oats may be sown for this purpose in early spring and turned under in June; Italian ryegrass may be used in case a temporary lawn is desired during the summer. These crops should be plowed or spaded under at least a month before sowing the seed for the permanent lawn to come.

GRASSES—AND GRASSES
At the left is ordinary turf, while creeping bent shows it up

HERE RED FESCUE, BLUEGRASS, *POA TRIVIALIS* AND REDTOP WILL BRING SUCCESS

LAWN

Mr. Fitts is now lawn specialist for the U. S. Department of Agriculture. He also serves as advisor to the Greens Committee of the United States Golf Association, and is considered one of the leading authorities on lawns in the country

H. ARMSTRONG ROBERTS

If the lawn maker is bent on sowing the northern grasses in the spring, the work should be under way at as early a date as possible. March sowing is better than April sowing, provided a good seed-bed has been made preferably the previous fall.

If grading is necessary this should be attended to some time in advance of sowing. Should the grading demand the removal of the top soil, this soil should be carefully set aside and replaced on the sub-soil after the grading is completed. It is important that the final grade be such as to provide ample surface drainage. It is never advisable to leave low spots or pockets from which the surface water will not flow freely. A poorly drained area can never be depended upon to produce a good lawn.

A good lawn soil is one which will produce a good yield of any of the common field or vegetable crops. If you have that kind of land you are fortunate. About all that is needed in the way of improving such a soil is the addition of commercial fertilizer.

Either bone meal or cottonseed meal may be used in the preparation of the soil at the rate of about 20 pounds to 1,000 square feet. This should be applied just before the seed is sown and after the soil has been thoroughly plowed. The fertilizer should be worked into the surface in the final process of preparing the seed-bed.

It may be assumed, however, that most lawn makers are not fortunate in having as good a soil as described above. Sometimes the soil has been taken from a cellar excavation, in which case the problem is difficult. Sometimes the lawn is to be established on stiff clay, or,—worse yet,—on sand.

The first consideration for one who is confronted with the problem of making a lawn on poor soil is to improve the texture or mechanical condition and the fertility of the soil. The necessary plant food may be easily supplied from the fertilizer bag, but the organic matter and other materials necessary for the improvement of the soil texture is a more difficult matter. Well rotted stable manure is probably the best organic material for this purpose. It should be used at the rate of about one-half a ton per thousand square feet. The best plan is to plow or fork it into the top six inches of the soil. Where manure is scarce, and a person is willing to delay sowing his lawn, it is often a good plan to grow green manure crops as referred to above for a half-year or a year. If the lawn is to be established on excavated land, perhaps the best plan is to apply a good top soil to the graded surface to a depth of three or four inches.

In the case of extremely sandy soil it is often desirable to apply about two inches of clay or clay loam, which should be thoroughly mixed with at least two inches of the surface soil. In this way a four-inch layer of loam may be obtained. It is also necessary to add organic matter in some form, which may be applied as suggested above either in the form of stable manure or green manure crops. It is of course possible to have a fair lawn on sandy soil without the use of clay, provided a sufficient quantity of organic matter has been incorporated, and that the owner is equipped

INTERNATIONAL NEWSREEL

BENT FOR THE PUTTING

This makes a fine, even carpet, on which alibis can hardly be made

THE HOME OF BLUEGRASS

Also white clover and redtop. The two last-named will also grow well much farther south of the darkened area

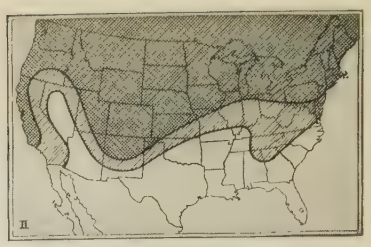
to water frequently during dry, hot spells, but under such conditions very close attention is required.

In the case of very stiff clay soil, an inch of sand spread over the surface and then thoroughly worked in and mixed with three inches of the top soil will be found beneficial. It will be necessary in this case also to apply the organic matter. In addition to supplying the organic matter required by the poor soil it is also necessary to add plant food in the form of some commercial fertilizer. This may be done by applying bone meal or cottonseed meal, as suggested above. In case, however, that mixed fertilizer is desired, one containing a high percentage of nitrogen should be used. A formula of 6-8-4 answers this requirement and should be applied at the rate of about fifteen to twenty pounds per one thousand square feet of surface.

Sometimes it is impossible to obtain stable manure to supply the organic requirements of soils, and in such cases either mushroom soil, or what is commonly known as woods earth or leaf mold may be used as a substitute.

While lime for many years has been considered beneficial to the growth of Kentucky bluegrass and clover, it has been found, through the experimental work at the Arlington Turf Garden during the past four years, that it is not essential to the production of turf for either lawn or golf course purposes. This applies to Kentucky bluegrass, Bermuda and carpet grass, as well as to the bents, fescues and other fine turf grasses. In this experimental work lime has been of no benefit whatever to the turf grasses, but it has in most cases encouraged the growth of weeds, crab grass and other undesirable foreign plants. The results of these experiments have led to the conclusion that it is best to eliminate lime entirely from the lawn program.

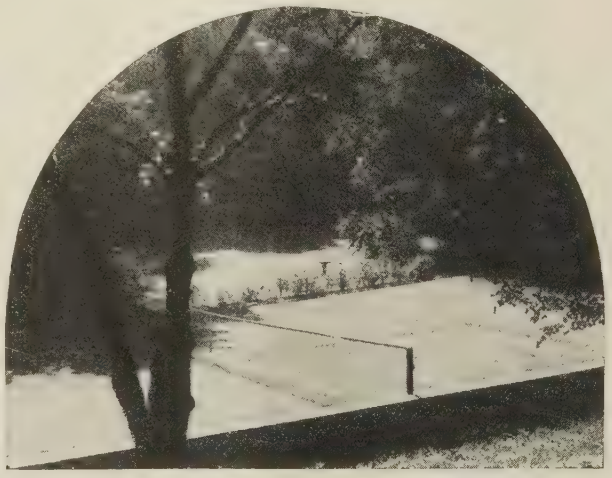
After the soil has been plowed or spaded thoroughly and kept under cultivation for a sufficient length of time to get it into a good state of tilth, and after the fertilizers and manure, etc., have been worked into the soil, it is desirable to prepare a good seed-bed for the reception of the seed. This may be done by a light harrowing or raking of the surface, and should be done so thoroughly as to firm the soil well and thoroughly pulverize the surface.



BENT AND RED FESCUE

In the darker area, these grasses flourish, but below, require great care, and in the white will not grow at all

Now comes one of the most important items to be considered in the making of a lawn and that is the selection of the proper seeds. For the ordinary northern lawn which is exposed to the sunlight throughout the day a mixture of Kentucky bluegrass and redtop, in the proportion of 80% of the former to 20% of the latter, has been found to be very satisfactory. Of course in case white clover is desired in the lawn, 2% to 5% white clover may be substituted for the same percentage of either redtop or bluegrass. It is, of course, simply a matter of taste as to whether clover should be used.



H. ARMSTRONG ROBERTS

A SHADED COURT

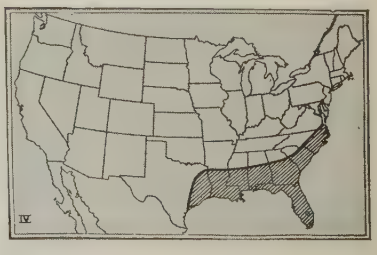
Perhaps red fescue, bluegrass and redtop are best here. Bent, too, makes smooth turf

For partially shaded lawns, 30% each of red fescue, Kentucky bluegrass and *Poa trivialis* and 10% redtop will give good results. For areas which are shaded most of the day by trees, 50% red fescue, 40% Kentucky bluegrass and 10% redtop should be used, while for areas shaded by buildings or walls the better part of the day, 50% *Poa trivialis,* 40% bluegrass and 10% redtop should be used. For the southern lawn on high well drained land Bermuda grass is best for the summer lawn, while on low moist land carpet grass will be more satisfactory. For the winter lawn in the South, Italian rye-grass should be sown in September.

The quantity of seed to be sown should be about four pounds per thousand square feet, which is about one hundred and seventy pounds per acre, except that Italian rye should be sown at the rate of about eight pounds per one thousand square feet. The seed should be scattered evenly over the surface and then covered by a light raking or harrowing. It is a

WHERE BERMUDA GRASS GROWS

It is king in the double-hatched area, but competes with bluegrass and others in the single-lined regions



CARPET GRASS IS LIMITED

Only in the little section of the southland does it flourish. It is best for lawns in moist places

good plan to sow half of the seed in one direction, then rake or harrow lightly, and then sow the other half at right angles and rake or harrow again. After the seed is sown a light rolling is desirable, as this encourages a rapid germination of the seed in as much as it tends to hold the moisture in the soil near the surface. In case of a dry spell following the sowing of the seed, it is well to be prepared to sprinkle with a very light spray of water in order to protect the young seedlings from drought.

There are certain conditions, however, under which it is not advisable to depend on seeding as a means of establishing a lawn. Steep banks or terraces, for instance, should be sodded as this is about the only manner in which turf can be successfully established, as the problem of erosion is readily overcome in this way, whereas if seeding is relied upon this problem in many cases is very difficult to overcome. In case the sodding method is employed, a good quality of sod consisting of such grasses as are suggested for seeding under like conditions of exposure or shade should be selected for use.

TOPDRESSING THE LAWN

Grass, like other plants, requires food, and the owner of a good lawn feeds it carefully

If a super-lawn is desired and the interested party is willing to give his lawn the necessary care, South German or Rhode Island bent seed or creeping bent stolons may be planted in the North and a wonderful lawn developed. If bent seed is used it should be sown at the rate of three to five pounds per one thousand square feet. If creeping bent stolons are to be planted a suitable strain should be selected, planted and cared for as follows:

One square foot of well-developed nursery row should furnish sufficient stolons to plant ten square feet of turf. The same soil preparation is necessary for planting stolons as in the case of planting grass seed. It is important to have all preparations made so that the stolons can be planted immediately after they are received. Stolons allowed to remain in bags or in bulky piles for any great length of time are very likely to be damaged from heating. Therefore, if for any reason it is impossible to plant at once, the stolons should be dumped out of the bags and loosely spread in a shady, cool place where the air can get to them, and should be kept moist. The stolons should be cut up into lengths of two inches or thereabouts, and pulled apart or separated so that they may be distributed evenly over the surface of the ground. For cutting the stolons a feed cutter or a combined feed cutter and shredder will answer, or if no such cutter is available, the stolons for a small lawn may be chopped up by placing them on a chopping block and using a hatchet or meat cleaver. The cut stolons should be broadcast uniformly over the surface. A live joint to every square inch is sufficient to give a first-class turf; however, to insure an even stand it is advisable to spread the stolons somewhat more thickly, which may be done by utilizing one square foot of nursery sod in planting ten square feet of lawn.

As the stolons are being broadcast some one should follow closely behind the sower and apply a light covering of well-pulverized topdressing material. It is not necessary to add fertilizer to the topdressing. Do not cover the stolons too deeply. It is necessary to apply only sufficient topdressing to hold the stolons in place. Never cover more than one-fourth of an inch; even less is advisable in most cases. This is very im-

THE LAWN BEAUTIFUL

It lends enchantment to gardens, frames flowers, and makes houses into homes

portant, as a heavy covering tends to retard the growth of the stolons, and consequently a longer time is required for the development of turf. In some cases excessive covering has made it impossible, or at least exceedingly difficult, for the young shoots to reach the surface, and the results have been disappointing. Immediately after planting it is essential that the lawn be rolled lightly so as to press the earth around the stolons. This holds the stolons in place and in contact with the moist soil, encouraging quick root development and growth of the grass. Immediately after rolling, the lawn should be thoroughly sprinkled with a fine spray of water and as often thereafter as necessary to keep the surface moist. This is essential under all conditions, and especially so when the weather continues dry. The surface of the lawn should be watered twice a day at least in dry weather during the first two or three weeks, and thereafter usually once a day during dry weather. Care should be taken not to water too much, however, as a soggy condition of the soil is harmful to bent.

Cutting should begin as soon as the young shoots or plants have reached a height of one and one-half or two inches, and thereafter the grass should be kept closely clipped. The clippings from the first few mowings may well be left on the ground and a light topdressing applied over them, as where there is a joint or node on any of the clippings there is a bud that may develop into a plant, thereby helping to thicken the turf. Begin with the first mowing to cut the grass down to not more than a half inch and continue this every two or three days.

The lawn should be topdressed as frequently as necessary to keep the turf filled to such a degree that it presents a smooth, firm surface. The material to use for topdressing should be of a loamy texture. A good grade of topsoil is satisfactory; this should be applied at the rate of about one to one and one-half cubic yards per five thousand square feet, and about ten pounds of ammonium sulfate should be mixed with each cubic yard of topdressing material. In the late winter or early spring, as soon as the frost is out of the ground and before the first spring topdressing has been applied, the lawn should be rolled lightly so as to firm the topsoil and smooth out irregularities which may have resulted from the action of frost during the winter.

One of the first and probably the most important matters to be considered after the lawn is planted is that of keeping it free from weeds, such as crab-grass, dandelion, and other foreign vegetation. If care is taken to pick these weeds out of the new lawn as they appear during the first year the trouble with their kind in subsequent years will be materially reduced; consequently it is advisable to keep the new lawn as free from weeds as possible from the beginning. This is important regardless of the kind or kinds of grass used.

The problem of fertilization for the lawn has caused quite a little trouble as a result, to a great extent, of the fact that most lawn owners have not taken the trouble to find out the proper fertilizer to use, being satisfied to follow the same methods in this respect that their forefathers practiced years ago, before anyone had ever taken the matter of lawn fertilization seriously enough to attempt to find out the actual needs of the lawn grasses. With the information that is available at this time, however, the lawn fertilization problem is a simple one. Just a simple application of cottonseed meal two or three times during the growing season, about April 1, June 1 and August 1, will be found to give excellent results. This should be used at the rate of about fifteen pounds per one thousand square feet, and it may be purchased from your local feed dealer. An application of three pounds ammonium sulfate per one thousand square feet two or three times during the season in addition to the cottonseed meal will be helpful as this fertilizer has a tendency to discourage certain undesirable weeds. Ammonium sulfate should be used cautiously and should be thoroughly watered into the soil immediately after it is applied, otherwise the grass may be badly burned. It is safer if applied on a cool day. Either of these fertilizers may be applied satisfactorily when thoroughly mixed with compost or good loam topsoil, which should be applied to the lawn once or twice during the growing season at the rate of about one cubic yard to five thousand square feet. This topdressing is important apart from the fertilization factor as it replenishes the organic matter in the soil and adds new soil to the surface which serves as a mulch, and in a manner acts as tillage which is necessary to keep any soil in good physical condition.

Watering the lawn during dry periods in summer is a very important factor in lawn-turf maintenance. There is only one way to determine the quantity of water needed on a lawn and that is by watching it carefully. As long as the grass is vigorous and has a lively green color, artificial watering may be withheld with safety, but with the first indication of a dull color and sickly appearance water should be applied conservatively. That is, the lawn should be sprinkled liberally but not enough to make the ground soggy. Such applications of water should be repeated as often as is found necessary to keep the grass in a healthy condition. Grass requires more water on a light or sandy soil than it does on a heavy or clay soil. The lawn should be mowed frequently enough to prevent an overgrowth of grass—that is, the grass should not be allowed to grow to a height of more than one and one-half to two inches. A heavier growth of grass has a tendency to thin the turf out as it shades the surface and interferes with the proper development of the new shoots which are necessary for the perpetuation of turf.

So much for the making and the subsequent care of a lawn. Now there are many old established lawns which are not satisfactory, and which the owners would like to improve. There are a number of different unsatisfactory conditions that require different treatment for the best results. For instance, the lawn that has become so heavily infested with weeds and summer grasses that the turf-grass has been practically smothered or crowded out is a condition existing on a great percentage of the old lawns in this country. There is only one practical thing to do with such a lawn and that is to remove the covering of weeds or undesirable vegetation and build a new lawn from start to finish.

Another condition that is frequently encountered is a thin, sickly looking stand of grass that indicates starvation. This lawn will be greatly improved by consistent topdressing, fertilizing and watering as suggested

for the new lawn. If such a lawn is on sandy soil, a dressing of clay or clay loam occasionally (preferably in the late fall or early winter) will be helpful, or if it is on heavy clay soil, it should be topdressed occasionally with light soil containing a high percentage of organic matter and sand.

There is also the lawn made up of fairly good turf in certain areas while other areas are practically bare. The owner does not care to sacrifice what good turf he has in order to prepare a new lawn. The solution in this case is to pick out all weeds, then rake or scarify the surface thoroughly, then sow seed as suggested for the new lawn; apply a topdressing of compost or good topsoil at the rate of about one cubic yard to three thousand square feet as a covering for the seed, then roll the area lightly and sprinkle when necessary to keep the soil moist. If this topsoil is allowed to become dry after the first sprinkling it is liable to bake and thereby interfere with the development of the seedling grass.

After the renovating operations have been completed it will be necessary to follow the same maintenance methods as suggested for the successful making of a new lawn.

IN the April issue of Nature Magazine Albert A. Hansen told how to have a weedless lawn. His article was widely quoted and reprinted and awakened enthusiastic response. Among the republications is one in the form of an attractive bulletin brought out by the Lawn and Service Department of The Barrett Company. This company has kindly offered to supply readers of Nature Magazine with a copy of this handy and valuable booklet. Just write Nature Magazine asking for "Have a Weedless Lawn".

Also as a matter of service to our readers, in connection with Mr. Hansen's article and the accompanying one by Mr. Fitts, may we suggest that valuable information may be found in the booklet, "Bent Lawns", which may be obtained from O. M. Scott, 661 Main St., Marysville, Ohio. The home owner struggling with stubborn bare spots should also address an inquiry about Pachysandra to Hugh B. Barclay, 1280 Montgomery Ave., Narbeth, Pa. Nature Magazine's Home and Garden Department will be glad to help readers with their lawn problems.

THE SPORTSMAN and the WOODCOCK

Twenty-Seven to One Are the Odds

by Edward A. Preble

Readers of Nature Magazine will recall Mr. Preble's article on "The Vanishing Woodcock", which was widely quoted by conservationists. This brief is a further report on the situation affecting this bird.

DEAR TO the heart of the sportsman is our long-billed snipe of the woods. Around this theme have been woven many an autumn tale, and the idea has even been expressed in metrical verse. The actual breadth and depth of this affection, however, has seldom been expressed in figures. Let us, therefore, note some comparisons of the relative numbers of hunters and dead woodcocks, gleaned from the reports of the New York Conservation Commission and the Bird Day number of the Bulletin to the schools lately issued by The University of the State of New York.

From these sources we learn that this state, which was the first (in 1791) to offer any protection to this much-persecuted bird, still allows each of its 300,000 licensed hunters to kill twenty-four woodcock each year—if they can find the birds.

The interests of sportsmen are legion, so necessarily not all are woodcock shooters. The actual number of these not being published, however, we are reduced to using average figures. On this basis, some measure of the success that attended the efforts of this brave army may be gathered from the statement, based on official figures, that it required on an average twelve men, fortified by guns and dogs, to kill each woodcock taken in 1921, fourteen men in 1922, twenty-one in 1923, and eighteen in 1924. Publication of the figures for succeeding years is awaited with interest.

Pennsylvania's 800,000 hunters are said to account for about 30,000 woodcock yearly, in addition to other game. Of course, not all these actually hunt our singing wood-snipe, so the apparent proportion of twenty-seven to one may be an unfair reflection on their actual prowess.

As the surviving birds fly southward toward their winter home it must be evident that fewer can be killed, so we are not surprised to learn that the army of Virginia is able to kill only three or four thousand woodcock during each Indian summer season. Let us not inquire too closely as to the actual number of 150-pound men, each carrying a seven pound gun, and accompanied by a fifty-pound dog, whose united efforts are necessary to reduce the woodcock population by each eight-ounce bird.

We wonder how long a bird that lays only four eggs once a year, and one so dear to the sportsman, can stave off extermination.

THE WOODCOCK COULD SPARE SOME OF THIS DEVOTION

A ROAD AND A FIRE LANE

Protection and recreational facility are combined in this forest feature

FEU AUX BOIS

Why a Whole Town Turned Out to Save its Forest

By

Nelson Courtlandt Brown

of the New York State College of Forestry

RUFE CONKLIN sold mill machinery. That was why this July morning found him in Rupt eating the abbreviated French breakfast on the terrace of the *Tonneau d'Or* and reading day before yesterday's *Paris Herald*. His job was to survey and develop the French market, which was another reason for his being in Rupt where Pierre Jeandel had the first and favorite of his several textile factories and made his headquarters. Two days now Rufe had been in Rupt seeking audience with Monsieur Pierre, a gentleman of the old school of business procedure and, hence, inclined to the ceremony of delay.

If the truth were known, however, Rufe didn't much care when Jeandel got around to seeing him. He liked Rupt with its quiet beauty, the Moselle meandering silverly along one flank, sizable wooded hills bulwarking it on the other. Yesterday, appointment failing, he had wandered into the forest and loved it. It was much more orderly than the giant forests of Douglas fir near which he had grown up. Here each stray twig had been gathered from the forest floor; there, great trees lay fallen amid a tremendous tangle of undergrowth, having abided their centuries and died of old age or fallen before a storm and crashed down. At one point in the forest woodmen worked, carefully cutting out certain trees adorned with cryptic marks that apparently singled them out for taking. At home he had watched many an area stripped by high lead logging, burned over once, twice and more, often to become a waste and blackened land.

"These fellows certainly nurse their trees, but I imagine they have to", Rufe mused as he descended the hill to the town again.

So this morning Rufe was wondering in which direction to wander after he had againsent his card in to the manufacturer. But, suddenly, the bell in the ancient church untongued with great clatter, and the whistle at the factory joined in the chorus. All Rupt broke loose with noise of something alarming.

BRUSH IS RARELY BURNED IN THE FRENCH FORESTS

Rather is it gathered twig by twig to be used as firewood, the forest floor being thus kept clean

HOUSE OF THE GUARD OF THE FOREST

These men are specially trained for the work in the forests

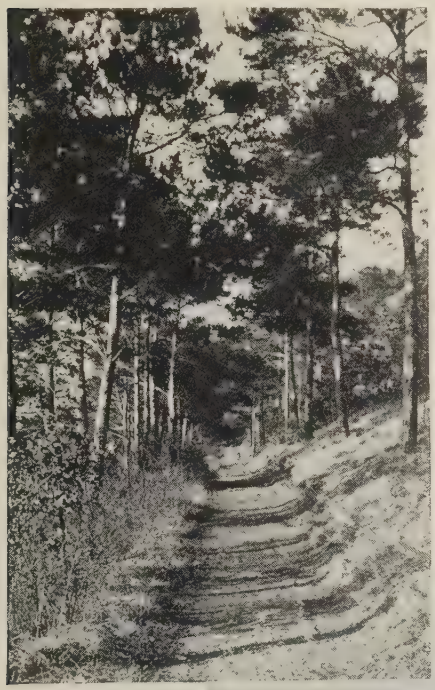
THE RIVER MEANDERED SILVERLY

The French villagers pride themselves on the way they protect their forests

Annually thousands of acres of our forests are swept by forest fires, causing a monetary loss of an average of $15,000,000. Some of these costly attacks by the "red enemy" are inevitable,—the results of natural causes such as lightning. The greater proportion, however, result from man-made sources and a large percentage of these are born of carelessness,—the burning match or cigarette, carelessly tossed aside; campfires neglected when still alive; the thoughtless burning of brush. This story, Feu aux Bois, *sets forth in simple terms a different attitude toward forests and forest fires and carries a real message of conservation.*

"Either a holiday or general mobilization", Rufe suggested to himself.

"Feu aux bois", shouted the good proprietor of the *Tonneau d'Or,* as he tore off his apron, threw it on the zinc bar, grabbed a hat and raced out into the street.



FIRE LANE KEPT FREE OF LEAVES AND BRUSH ALWAYS

Many such protectors against the spread of fire are to be found in the French forested areas

"Feu—fire; *bois*—wood", Rufe pieced out of his vocabulary. "Forest fire, bigosh! I'm in on this", and dashed out to join the butcher, baker and blacksmith heading toward the patch of smoke that rose from the hillside.

By the time the villagers,—and Rufe,—had reached the fire it had gotten some headway, particularly to the south. On the north side a well-cut fire lane promised to check it. Three men in uniform were busily sending out the arriving help to encircle the fire. It was to be a pretty tame blaze, Rufe observed, beside some he had seen sweeping through the virgin timber in his home Northwest. Yet the Frenchmen seemed to take it pretty seriously, so he picked a shovel from the pile on the truck run up from the village, took his place in the line of defence and set to work on a shallow fire trench to stop the run of the fire along the forest floor.

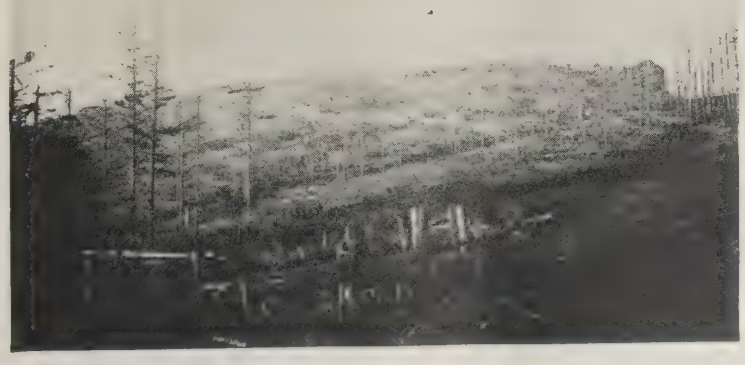
For a quarter of an hour Rufe worked in silence, sweat furrowing the smoke-grime that gathered on his face. Rapid progress was being made in checking the fire by the time the end of Rufe's trench joined that of the Frenchman next to him. He had noted his fellow fire-fighter only vaguely, but now that he straightened from his task he saw a small man in severe black suit and shoes; starched white shirt wilted and spotted, white hair disheveled, moustache awry and brown eyes agleam from the effort.

"C'est fini, n'est-ce pas"? the Frenchman asked.

"I reckon so", Rufe replied, in English.

"Tiens!" exclaimed the little man in surprise, continuing also in English. "You are American and have helped us save our forest from the fire? That is gentle of you, my friend".

"Why not"? said Rufe. "The whole town turned



NOT THE RESULT OF A COSTLY FIRE

Just an instance of the forest loss to France in the war

out so why shouldn't I lend a hand? As a matter of fact I liked this forest and hated to see it burn up. Seen too many forests burn at home".

"And that is why all of our village turned out to fight this fire, also", the Frenchman went on. "We have too few forests and the war cost us thousands and thousands of acres. We cannot afford to let them burn. Many of our villages are given life by our forests which permit them to make toys, charcoal, paper and pulp and many things from the wood of our trees. They must cut only such trees as are of the proper age, leaving the rest to grow older. We cannot cut them all and wait thirty, forty, fifty years for a new forest to grow. Thirty years between one dinner and another is a long time. So, you see, we cannot let our forests burn, then tighten our belts and let the forests grow once again".

THE YOUNG PEOPLE LOVE THE FORESTS
Taught to know and to protect the woods in school, it is a part of their being as men and women

"I understand", Rufe nodded, "but in my country we have great fires. This one today was nothing in comparison. Some fellow chucks a cigarette in the woods and goes away, or another kicks his campfire to pieces and drives away. Then comes the fire. Don't Frenchmen do this, too"?

"Malheureusement", the little man replied, "there are some so careless. But they are few and to the Frenchman they are the criminal. They take from him and his family their bread and their butter. They wreck his beautiful hills, but more, they put the hand in his pocket and steal his wealth. It may be that you Americans do not look at it this way. I have been in your country but I have not studied the forestry there".

"I guess probably that is the reason", Rufe answered. "You see we've always had so much timber that only just now people are beginning to know that we are using it much faster than we are growing it. People are beginning to be educated about it, and the schools—"

"Ah, mon ami", the Frenchman interrupted, "there is an important thing. The schools, the young people. If they grow up knowing the value of the forest; if they are taught as children to love the forest and to protect and to know the trees, then they will rush to its defense when it is in peril. It is so in France, in Germany, in most of Europe. Families go into the woods on Sundays and on fête days for—how you say?—picnic. It is their forest; they must be careful of it. *Voila!*

"Of a certain, our forests are protected, too, by our foresters. The little house there by the stream is the home of the *garde forestier*. It is he who has charge of the fire towers, the telephone system of alarm, the patrols and the pathways and lanes that aid to check the fire as did we with our ditch today. They keep the forest clean; they mark the trees that may be taken and those that must be left to grow older. They are men of special training, these guards, and we are all happy when we can help them in their task as we have done today.

"Mais, pardon mon ami". The little man threw out his hands in apology. "I have bored you, I fear, with the story of our forests. I was moved by your so kindly fighting with us against the fire. *Tiens"*—his face lighted,—"perhaps you are the American who has been wishing to see me. I am Pierre Jeandel".

"Is that a fact"? was all Rufe could manage.

"No kidding, as you say", M. Jeandel chuckled. "Come, we will go to my house for a *déjeuner* that we have well earned. After you shall tell me of your most wonderful machines that I may buy many from you".

"WHO SAID ANYTHING ABOUT THESE BEING DOG DAYS"? MARY BEAL

The NARCISSUS BULB FLY

The Pest That Caused a Quarantine

by Charles F. Doucette

U. S. Bureau of Entomology

BUZZ-Z-Z-ZIP ! Up into the sun darts some sort of an insect, quickly lost to sight. Sounds much like a bumblebee. Perhaps it is. But hush, there's another just alighting in the daffodil leaves near the ground. See it? It's orange with a black stripe on its back. Yes, on that third leaf. It certainly does look like a bumblebee. But—it has only two wings and a bee has four. It must be a narcissus bulb fly going about the business of laying a small, oval white egg at the neck of a bulb, just under the surface of the ground.

The narcissus bulb fly, *Merodon equestris,* often referred to as the daffodil fly, has long been recognized as one of the most serious insect pests to narcissus in Europe. The entry of these into the United States with narcissus bulbs, together with like pests dangerous both to bulbs and other cultivated plants, led to the promulgation by the United States Department of Agriculture of a quarantine, effective January first 1926, greatly restricting the entry of narcissi.

In the Atlantic coastal plain extensive plantings of narcissus date back nearly a hundred years. The tremendous expansion of the bulb industry during the past few years and the fact that some of the planting stock imported prior to the placing of the restrictions was infested with bulb pests, has increased the risk of these pests becoming established, especially in old, uninfested, naturalized plantings. As a result of the widespread interest in bulb production, naturally the interest in bulb pests has also increased, and a more intimate study of their life is being made by interested scientists.

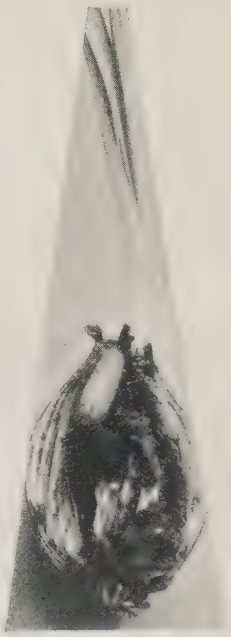
NARCISSUS
The victim of the bulb pest

HEALTHY BULB
Note the strength of the root growth

A rather inconspicuous white larva hatches from the egg of the narcissus bulb fly in about six days. He wastes no time but wriggles and squirms down through the soil at the side of the bulb until he reaches the bottom and then begins to burrow right in. After tunnelling around the base of the bulb for a few days the grub moves upward into the center. Back and forth he eats his way and rapidly fattens at the expense of the bulb, which serves as dining room, parlor and bedroom through summer and winter.

The full grown larva is nearly cylindrical in shape, three fourths of an inch long, the thickness of a lead-pencil and has no legs. Its color is dirty white which is more or less concealed by the mass of brownish decayed bulb tissue in which it lives. The skin is wrinkled and leathery. A stubby, reddish-black breathing tube protrudes at the tail end. The larva is also equipped with a dark inconspicuous mouth-hook which the insect pulls in when disturbed. This is shaped much like the upper beak of a parrot and serves in place of jaws. It is controlled by strong muscles and thus he rasps and tears the tissue of the bulb. It seems hardly possible that such damage can be done by a single larva, but an infested bulb can, in most cases, be counted a total loss.

It is in April, May and early June that eggs are deposited and the grub becomes full grown about the end of September. During the winter it remains in a dormant state. The following spring the larva works its way out through the neck of the bulb and upward into the warm soil. Here, with the breathing tube projecting above the surface, it enters the third stage of its life,—the pupa—that remarkable period during which insects make such an extraordinary change in their form. The legless, wingless, hairless grubs go through this period and emerge in three or four weeks as six-legged, two winged, fuzzy flies. And these are the fellows that go "Buzz-z-z-zip"! into the sky when disturbed by approaching humans.



SICK BULB
How the larva has damaged it

It would be pleasant to think

TENANTS GONE
Empty egg cases left by maggots that have departed for their work

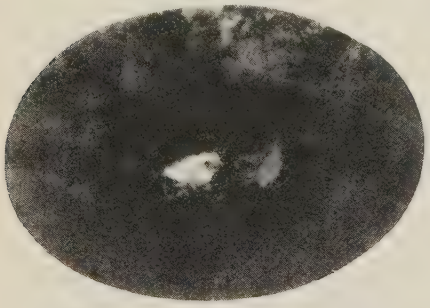
that these obnoxious pests did not exist in our country, but they are already attacking the narcissus bulbs in a few sections and who can tell when they may be found in others? In localities where the fly has appeared, the growers are coping with the situation promptly and have made good headway in clearing up the territory.

No completely satisfactory measures have been developed as yet to control the devastator. To kill the larvae in the bulbs, the commercial growers of narcissus either fumigate the bulbs or treat their stock with hot water. This treatment consists of a three-hour immersion of the bulbs in water kept at a temperature of 110 degrees F. This warm bath was developed for another pest but it is thoroughly effective against the grubs in the bulbs, which would be killed by immersion for only half as long. Before treatment it is desirable to sort out those bulbs which show evidences of infestation. This requires a sensitive touch to determine the presence of any unusual softness in the bulbs, and a keen eye to observe the condition of the bases of the larger bulbs. The entrance hole of the grub may be seen when the dirt is scraped away. A further procedure is to dig up all bulbs which, in early spring, do not show normal growth. Whether or not the bulb fly is responsible for such lack of development, it is always wise to search for the cause. The removal of the bulb fly larvae at that season reduces the number of adult flies which might visit the plantings later.

PUPA CASE
(Below) The middle narcissus plant has succumbed

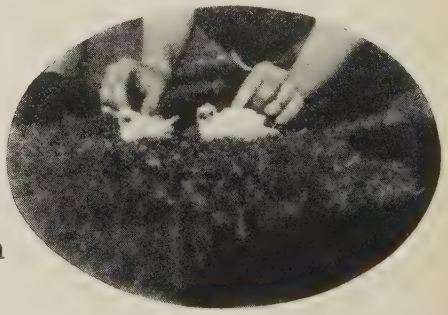
A BULB'S DOOM
Larvae of the narcissus fly, the bulb pest that has caused a quarantine

Since it is possible that this winged menace may descend upon any bed of golden beauties, it behooves *all* growers of the narcissus, even those with modest beds, to take every means to eradicate or to prevent the establishment of the bulb fly amongst us.



ALBINO MOCKERS

by Rachel M. Hutchinson



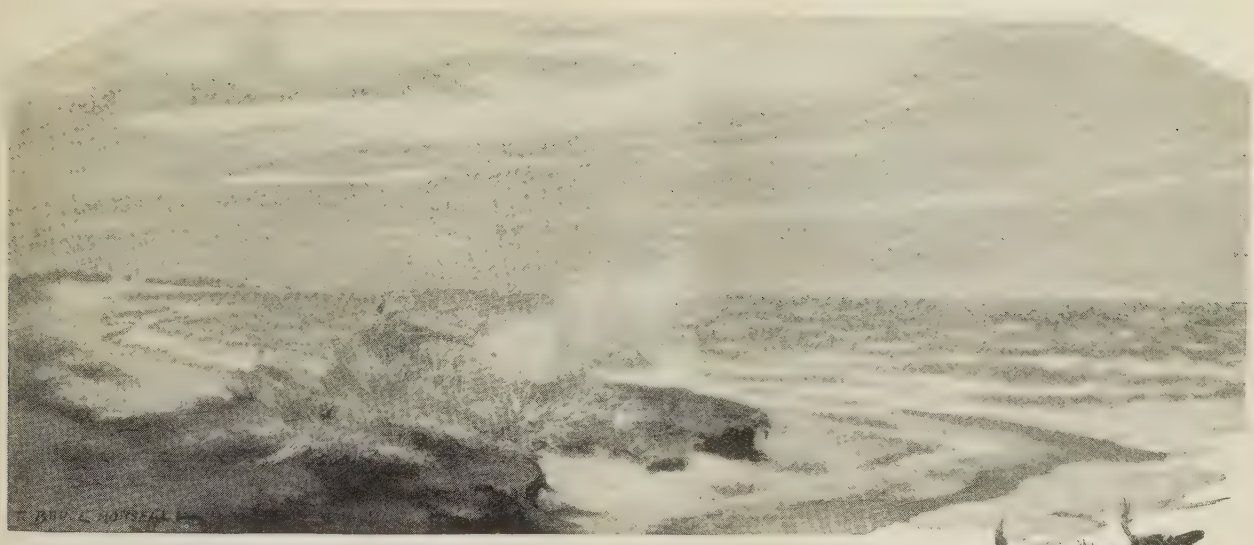
THESE are all mockingbirds and residents of Ardmore, Oklahoma. A sober gray mother mockingbird built her nest in a small evergreen tree and laid four apparently orthodox eggs. From them hatched three "natural" mockingbirds and one albino. When these birds were old enough, the mother bird returned to her nest and laid four more eggs—three of which hatched. One was gray and the other two were white.

Some of the questions to which eager Nature lovers are awaiting reply are: When the fledgling plumage is shed, what will the mature plumage be? As they grow older, will their eyes change to pink? Will they be the versatile musicians that their more sober-clad brothers are? Will they stay with us all the year as some mockingbirds do? Will their offspring, if they have any, be white, or gray, or a mixture of both?

These albinos are all pure white—not a dark feather on them anywhere. Even their feet and bills are whitish or ivory-colored. Their eyes are a grayish-blue instead of pink or the usual beady, black ones of the normal gray birds.

Ardmore has still another white member of its mockingbird family at least two miles from the other albinos. It is like them in every detail, and is about the age of the one first mentioned above.

Even if albinism is considered quite common, particularly with the crows and robins, yet it is always interesting to watch even a single specimen. One bird can cause almost a pilgrimage to the place it honors by its presence. Imagine, then, the pride and keen interest citizens of Ardmore are taking in this snowy quartet, and the earnest efforts being made to preserve all four of them, and see what the future will hold.



THE PASSING OF THE LABRADOR DUCK
A dull report sounded, waters splashed sullenly, and the last bird had gone

WINGS of MYSTERY

For A Time They Beat Loudly, Then Ceased Altogether

by Alexander Sprunt, Jr.

This is the second of four articles by Alexander Sprunt, Jr., on birds which once dwelt in America but faded before the onslaughts of "civilization". Mr. Sprunt, Curator of Ornithology at the Charleston, S. C., Museum, has so studied the species about which he writes that he is able forcefully to reconstruct their passing. We hope that these articles will serve to direct thought to those birds of the present day which are following the Labrador duck and the great auk into oblivion. There are a number of vanishing species now facing extinction.

We are, all of us, attracted by the Unknown. There is about it a glamor, a halo of hazy fascination which often leads one and another to delve into its dim and impenetrable depths, with the lingering hope that a rift in the murky curtain will be our reward.

Unknown countries and lands have led forth many to the doors of fate, and many other phases of the unattainable have had their devotees. Perhaps one of the outstanding subjects along these lines has been the investigation of vanished forms of life, of animals and birds, that have lived, died, and faded into the curtain of years behind us, and left but little of their history. Look as we may, we will find none which so appeal to the fancy, and touch the responsive chord of wonder, as does the disappearance from the earth of the Labrador duck, which, before anyone then acquainted with it was aware of the fact, vanished from human sight, and took its place in the ranks of the departed. Utterly, completely, has it gone, and none of us know why, or will ever know, to a certainty, the cause of his going.

The Labrador duck was supposed to have nested only along the rock-bound coast of the country from which it took its name; no nests were examined by scientific men however, and what information is available comes only from the natives and traders of that region. It is said to have built a rather bulky nest of fir twigs, and small branches, lining the structure with fine dried grasses and down from the mother's breast. Instead of being built on the ground as is usual with most ducks, the nests were placed in the tops of low, tangled fir bushes on the rocky islets and coastline. Nothing whatever is known in regard to the eggs. It is not, however, unreasonable to suppose that they possessed the general characteristics which are common to the great majority of the wild fowl family.

John W. Audubon, the son of the great naturalist, while visiting Labrador, was shown what the natives declared to be deserted nests of this duck, and what little is known of their make-up has been described.

The winter range of this interesting bird extended all along the New England coast, down through Long Island Sound, New Jersey, Maryland and Chesapeake Bay, but it was unknown south of this last named point. It will be seen that the winter range, as well as the breeding territory, was much restricted when compared to the very wide reaches of country covered by most ducks.

Like other particulars in regard to it, the habits of the Labrador duck are little known. It was, of course, familiar to some gunners and sportsmen, and a few scientists, but was not considered to be very rare and was little thought of at all. Therein is the wonder. Audubon never saw the bird alive and so did not describe it with the faithfulness to detail which he would have done had the bird come under his personal observation. The drawings which he made of the bird were done from specimens sent to him by Daniel Webster, and collected by him at Martha's Vineyard, Mass. These particular birds are now in the collection of the National Museum in Washington.

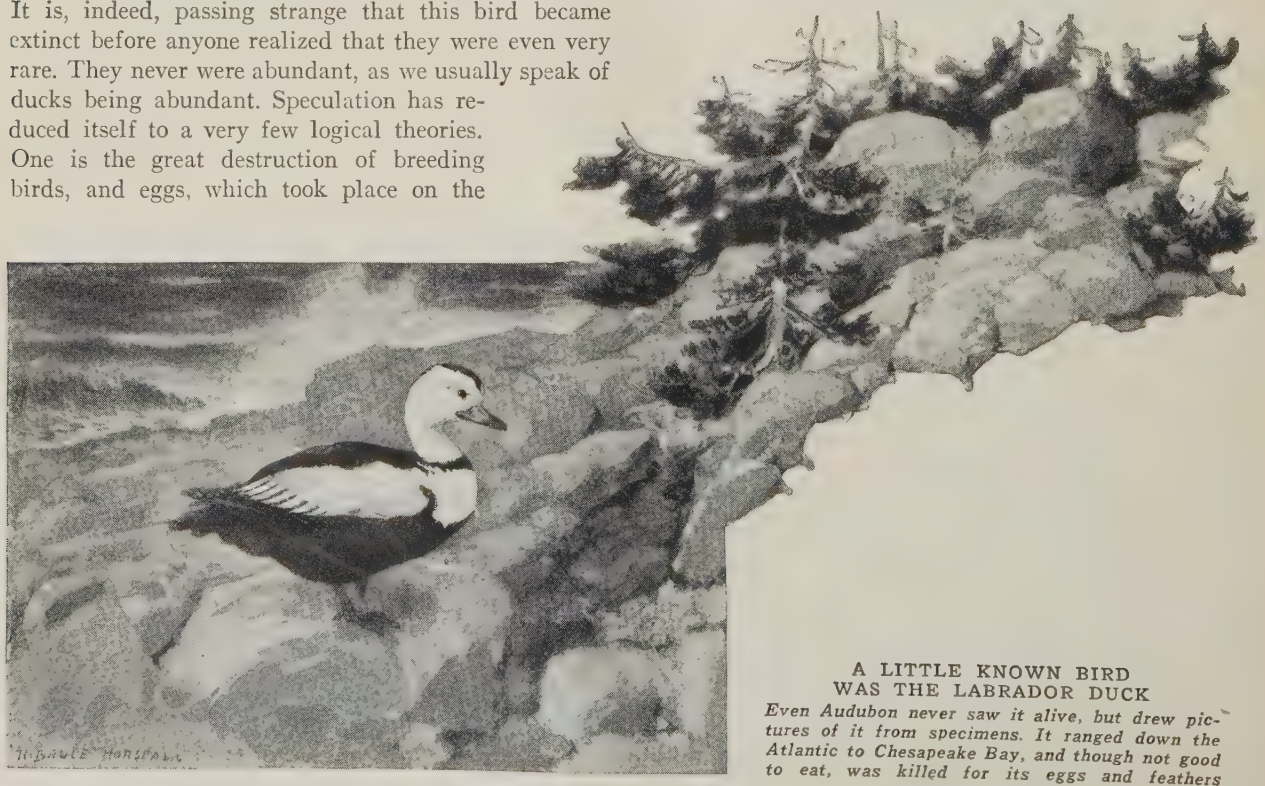
We do know however, that the Labrador duck was a maritime species, and one of its local names, sand-shoal duck, seems to indicate that it was fond of the bars and reefs in shallow water amid the surf and sounds of the coast. The food consisted of shell-fish, small fry, seaweeds, etc. As a result, the flesh was not desirable and was unfit for food. Birds were occasionally taken by gunners however, and it was not uncommon to see them in the public markets. That they did not command a ready sale is brought out in a letter from Mr. George N. Lawrence to Mr. William Dutcher, written in 1891, in which he states that he remembers "seeing six fine males, which hung in the Fulton market, until spoiled, for want of a purchaser". Audubon mentions having seen them in the Baltimore market and recounts that he talked with a taxidermist of that city, who made a practice of catching the birds by means of baited hooks on a trot line. He (Audubon) also states that he was told that the Labrador duck was a rapid flyer, and made a whistling sound with its wings as does the golden-eyed duck. They were usually met with in small flocks composed of from five to ten birds.

The utter extinction of the species remains a mystery. It is, indeed, passing strange that this bird became extinct before anyone realized that they were even very rare. They never were abundant, as we usually speak of ducks being abundant. Speculation has reduced itself to a very few logical theories. One is the great destruction of breeding birds, and eggs, which took place on the Labrador coast in the latter part of the eighteenth century and the first part of the nineteenth. Regular voyages were made to this locality for eggs and feathers and thousands of birds met their fate. Undoubtedly, many Labrador ducks suffered in this time of butchery. The natives and Eskimos killed them at every opportunity, taking the eggs as well. The very restricted breeding range must also be considered as a factor. The shooting by market gunners and sportsmen also had its share, but, perhaps not to any great extent as the bird was not desirable as food.

There can therefore, be little doubt that man was the chief agent in bringing about the destruction of this fine species. As far as is now known the last Labrador duck was taken near Long Island, N. Y., in 1875, and careful compilation by Mr. William Dutcher has brought out the fact that there are forty-two specimens preserved in the museums and collections throughout the world. The term "extinct" is usually associated by most people with birds like the great auk, or passenger pigeon, but there are many more specimens of the great auk in existence than there are of the Labrador duck. Of the former there are said to be about eighty birds and seventy eggs, and there are many more than that in the case of the pigeon. So we see that for scarceness of specimens and lack of information of habits and general knowledge, the Labrador duck, which went out of the world on wings of mystery, stands alone among our recently destroyed species.

* * *

It was a cold winter morning in the year 1875; the sun shone wanly upon a heaving waste of gray, sullen waters. A keen wind straight from the northern barrens swept over an off-shore bar, the dry rustling of the

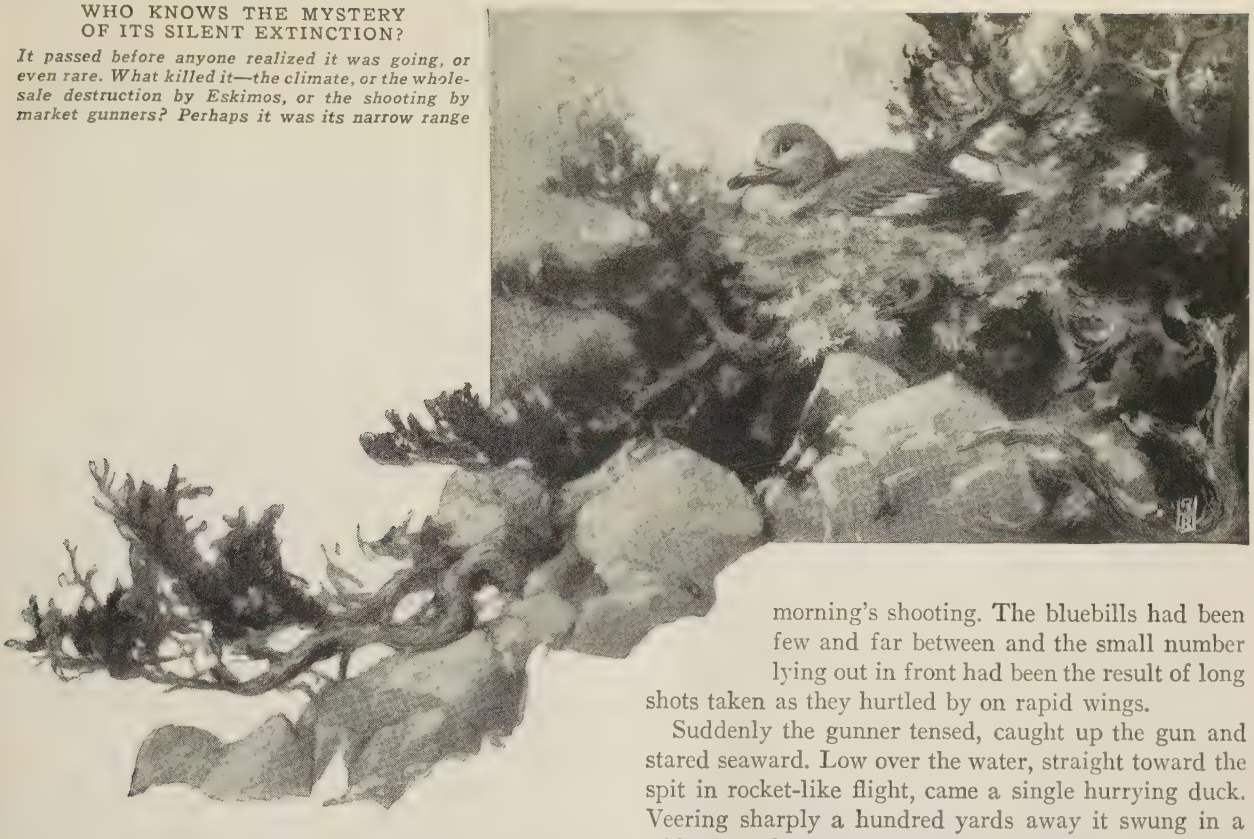


A LITTLE KNOWN BIRD WAS THE LABRADOR DUCK

Even Audubon never saw it alive, but drew pictures of it from specimens. It ranged down the Atlantic to Chesapeake Bay, and though not good to eat, was killed for its eggs and feathers

WHO KNOWS THE MYSTERY OF ITS SILENT EXTINCTION?

It passed before anyone realized it was going, or even rare. What killed it—the climate, or the wholesale destruction by Eskimos, or the shooting by market gunners? Perhaps it was its narrow range



bleached and withered grasses which clothed the low sand dunes mingled with the subdued roar of the surf as it rolled into the shallows. A sharp chill was in the air, accentuated ever and anon as a wisp of restless cloud obscured the feeble rays of the winter sun. A pale gloom enveloped the dim horizon and rendered the meeting place of sand and water an area of confused lights and shadows.

A bleak and desolate scene, seemingly waiting for a tragedy, a half expectant forewarning of impending doom seemed hovering in the murky mist to seaward. As if to heighten this illusion, a band of somber plumaged scoters swam and dived near the beach, their funereal color standing sharply out against the gray of the waters. On the point of a low sandspit reaching outward from the beach, was a clump of tangled grasses, in the midst of which, crouched in a slight depression, and shielded from view, was a man. Bundled in coat and hip boots he waited. A long-barreled gun with an open box of ammunition lay at his side.

Several yards out in the water in front of the blind were a number of painted decoys, bobbing and swaying at their anchors while, at the edge of the lapping water, six or eight limp, black-headed ducks with bluish bills and white bellies rolled and washed in the shallows, silent witnesses to the accuracy of the long-barreled gun in the grassy blind. The lone hunter had been out since dawn first flushed the eastern horizon and in shivering discomfort was experiencing a poor morning's shooting. The bluebills had been few and far between and the small number lying out in front had been the result of long shots taken as they hurtled by on rapid wings.

Suddenly the gunner tensed, caught up the gun and stared seaward. Low over the water, straight toward the spit in rocket-like flight, came a single hurrying duck. Veering sharply a hundred yards away it swung in a wide circle, broadside to the blind, shot high over the decoys, wheeled over the beach and once more rushing seaward turned into the wind and came straight for the blind. The wind whistled sharply through the whirring wings and the bird stood out distinctly against the drab background of the sky. Head, neck and wings were snowy white, while the rest of the plumage and a line over the head was shining black; a patch of orange stood out at the base of the blackish bill and the feet were grayish blue.

On it came, the wings set suddenly, and gliding up wind it reached the decoys. The tail spread widely, the feet dropped, and the wings beat heavily checking the flight almost to a standstill—when a spurt of flame pierced the grassy screen, a dull report reverberated over the waters, and, crumpling loosely in the air, with dangling head and drooping wings, it plunged downward. A sullen splash showed itself on the gray surface, while ever widening ripples chased shoreward. But listen! The wind had risen to a shriek, the moan of the surf broke with a sobbing cry upon the sand, and the pallid gloom seemed suddenly to become a dense gray blanket, while above, in the flying cloud wrack a sound rang out, which seemed, as it were, the hollow tolling of a bell, a death knell, echoing faintly over the restless waters.

Ah, yes, the voice of bereaved Nature sounding the funeral dirge of another of her children, as the life went out of that bird of mystery, and the last Labrador duck passed forever from amongst the ranks of living things.

We wish again to call the attention of our readers to the fact that the California issue will appear in October. The Golden State "cameras" well, and pictorially is of outstanding beauty. The issue is all that leading authorities on the Nature of the state can make it. Further announcement of this issue may be found on Page 70 of this number.

The Mt. Rainier Nature Trail

Which Hundreds Follow to Learn Nature's Story

by R. A. Johnson

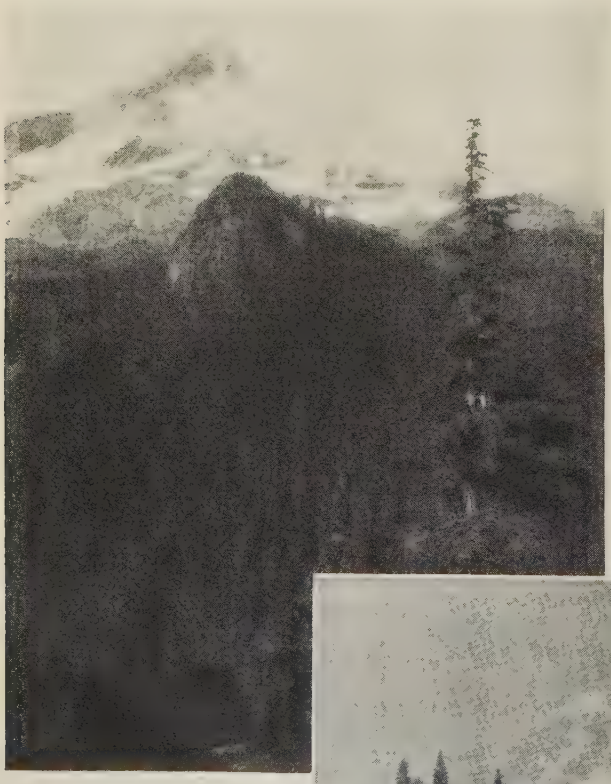
Photographs by the Author

To read and understand the signs along the roadsides and trails,—Nature signs, which are placed on every bush and every tree, and found in the movement of every bird,—is to appreciate the romance of creation, and get a clearer perspective of the world in which man plays only a small part. And for the many visitors who have tramped over the trails on the Nature-guide field trips which are a part of the Government's education service in Mt. Rainier National Park, new vistas have been opened, and a new world has been disclosed. Nature is rampant on these mountainous slopes. She has outdone herself in her lavish fashion.

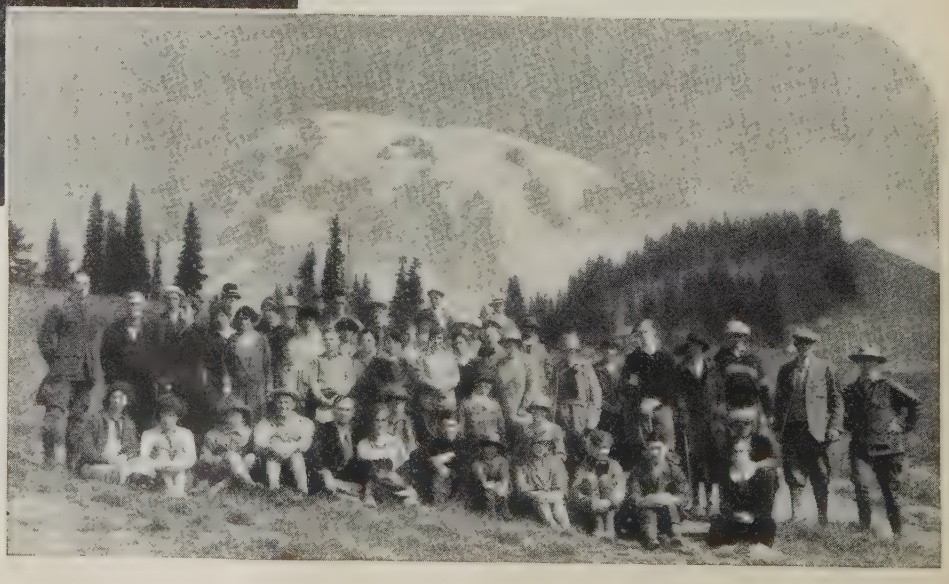
On the lower slopes of Mount Rainier and extending up the sides of the mountain to about five thousand feet in elevation, there is a very heavy forest growth. These forests, noted for the beauty and variety of their conifers, are especially remarkable because of the giant specimens of Douglas fir and western red cedar, many of them five or six centuries old and two hundred feet high.

Above this heavily-timbered zone, and below the eternal snow fields, another belt,—that of the alpine meadows,—offers the most interesting phenomena for Nature study. These meadows, of which Paradise Valley is a very fine example, are about two miles wide and extend entirely around the mountain. On these sparsely timbered slopes are the full glory of the flower fields of Mount Rainier.

One of the most interesting representatives of the floral kingdom is the heather. Like the general types of vegetation which show a general altitudinal zonation, quite frequently different species of one family are found favoring different altitudes within a zone. Thus we have three species of heather,—red, white, and yellow, growing from the alpine meadows to the beginning of the snow fields in the higher ridges. The giant hellebore with a broad parallel-veined leaf is an interesting plant, not only because of the tall spike of green flowers which it displays in midsummer, but also because it is from



AMID THE CLOUDS
Below the ice are alpine meadows and heavy forests



A TOURIST MECCA
Mt. Rainier National Park is a favorite among those who climb

this plant that hellebore insect powder is made. Another unique flower is the Indian paint brush which furnishes the red of the red, white and blue color scheme during the flower season.

Guests of the Park who come too late in the season to see the great white fields of the avalanche lily and the western anemone have compensation in the reds and yellows of the *Mimulus*,—which achieve a Japanese garden effect in little stream beds,—and in the gorgeous blues of the speedwells and gentians.

The two trees common to the alpine meadows, the alpine fir and the mountain hemlock, tend to grow in clusters. The older trees growing in the center of such clusters offer shade and wind protection, and help support the great weight of ice and snow, thus giving the little trees in their proximity a chance to survive.

Other representatives of the third and highest life zone, that of the rocks and snow fields, are mountain phlox, golden aster, stone crop, Lyall's lupine, and *Smelowskia*. The last named occurs at an altitude of eleven thousand feet.

Like plants, certain species of birds have habitat ranges defined by altitude limits. Thus on the lower slopes of Mount Rainier we find the ruffed grouse, in the alpine meadow region the sooty grouse, and in the high snow fields the white-tailed ptarmigan. If it is interesting to find these different wild life habitats, it is impressive to note that they are constantly undergoing a gradual change.

From the high wall of the Nisqually Glacier, one can look down upon a real, active river of ice, one that moves from sixteen to twenty inches a day. Because of the melting of the ice and snow, however, the glacier is actually receding.

From a lower shelf of one of the alpine meadows a visitor will see the Silver Forest on a small plateau a few hundred feet below. It is almost entirely composed of yellow cedar trees that are now great silver-gray monuments of past glory,—great silhouettes. The Silver Forest was caused by the carelessness of a white man. There are, however, other similar burns which are the result of fires purposely set by the red man who occasionally burned areas to create better berry-picking grounds, and at the same time to develop a more favorable habitat for small game. Not long, however, will Nature allow the work of man to hinder her development. Almost at once the dense forest reaches out to reclaim its own, and will do it, too, unless the soil is destroyed, or man again creates the havoc of which he is capable.

These, and other things, are found in Mt. Rainier Park by the lovers of the outdoors and the trail, and the searchers for the meaning of the wide-spread signs. Those who pass the way of the Nature trails wish to go over them again, and those who miss them whisper, later, their regrets.

Nature trails are new things,—they have been built for a new generation of people, for a people who are vitally interested in the out-of-doors and its meaning, who have lost their egocentricity born of long ages of introspection. In the days of Samuel Johnson, hills were only "considerable protuberances" and wild life was the subject of philosophical dialectics, and hardly anything more. The Mt. Rainier trail is but one of many which will eventually be constructed in our National Parks; it is but one of the few pioneers. No matter how many are built, however, it will long continue to be one of the best; it will continue to thrill those who travel it.

A DOUGLAS FIR
For six centuries it has guarded the mountain's slopes

ALPINE MEADOWS
Here trees grow only in clumps and snow fills the ravines

THERE IS STILL TIME TO PLANT FAST GROWING PERENNIALS

HINTS AND HELPS *for* *Home and Garden*

August

MAKE UP YOUR LISTS FOR EARLY EVERGREEN PLANTING NOW

by Harry R. O'Brien

THIS is a good month for saving your supply of perennial and annual seeds. As you go through the garden on dry days, watch for plants that have mature seed and gather it. The best container is a tin box or a glass jar. The wise gardener puts aside all through the year empty baking powder cans, coffee cans, tobacco tins, cocoa boxes, mustard jars and the like. Cigar boxes come in handy for seeds like hollyhocks and gaillardias.

* * * *

In selecting seeds, take them only from the largest and strongest plants and from full, large pods. Make sure that the seeds are fully matured and dry. Label each kind of seed else next spring you may not know which is pyrethrum and which anthemis. For a few cents one can get a box of small gummed labels at an office supply store which will save hours of guessing.

* * * *

If you have not ordered your supply of fall bulbs, do so at once. The catalogs ought to be in your hands by this time. Order preferably from one of the reliable bulb specialist firms.

* * * *

You will notice in the bulb catalogs that tulips are cheap this season, cheaper than they have been in years. There is a surplus in Holland, due to good growing seasons recently. This surplus is particularly of some fifteen or twenty of the varieties of tulips most popular in the United States. This will be a good year to stock up on these.

* * * *

Young shrubbery does better if it is given cultivation during the summer. Take a hoe or a speedy cultivator and work the ground around the shrubs two or three times this month. If the weather is dry, give the shrubs a drink. Don't sprinkle but run the hose to the base of each shrub and let the water run with the nozzle off until the ground is quite thoroughly soaked. Evening, while you smoke a rest pipe, is a good time.

* * * *

A mulch of sheep manure or bone meal will do a world of good to the roses this month, especially the hybrid teas, for it will keep the latter in thrifty condition for additional bloom. Scatter the fertilizer on the ground and then work it into the soil with a hoe.

* * * *

Phlox will be in bloom this month. Be sure that you do not let it go to seed. As soon as the bloom is faded, take your garden scissors and cut off the old bloom. You may be rewarded with an additional crop. The phlox that goes to seed soon deteriorates in color.

SOAK WELL THE SHRUBS

Cultivate them, too, with hoe or speedy cultivator, to make them prosper

* * * *

The past few months have seen a large number of new books published of interest to the garden lover. For instance, there is "Lilies and their Culture in North America" by W. N. Craig. This is published by the Florists' Publishing Co., 508 South Dearborn Street, Chicago, and sells for $3. The author is a notable figure in New England horticulture and a nationally known lily specialist.

* * * *

Then there is "Garden Cinderellas", a book on how to grow lilies in the garden, by Helen M. Fox, published by the Macmillan Company for $5. The author is one of the best informed amateur growers of lilies in America. "Consider the Lilies" was issued last year by W. E. Marshall

& Co., 150 West Twenty-third Street, New York City, and sells for $1. This is a famous commercial lily specialist firm.

* * * *

"More Aristocrats of the Garden" by E. H. Wilson, keeper of the Arnold Arboretum, is published by The Stratford Company, Boston, as a companion to "Aristocrats of the Garden" by the same author. The price is $5.

* * * *

The Macmillan Company has recently brought out "Evergreens for the Small Place" and "Rock Gardens", both by F. F. Rockwell, for $1 each and "Home Flower-Growing" by Prof. E. C. Voltz of Iowa State College. "The Care of Ornamental Trees" by C. F. Greeves Carpenter, also by Macmillan, is a handy little book with green covers that one can slip into the pocket.

* * * *

In 1921 the Mexican bean beetle began marching northward from around Montgomery, Alabama. It has now spread until it covers Ohio, a good part of Indiana, southern Michigan and parts of a number of eastern states. The first brood of adult beetles is likely to show up on beans in the garden this month. The adult is nearly hemispherical, about a quarter of an inch long, copper colored and has sixteen black spots on its back. Sufficient numbers will completely ruin a bean crop.

* * * *

Only spraying or dusting will protect beans from the Mexican bean beetle. Commercial preparations can now be bought. Or, for dusting, use a mixture of one part calcium arsenate to seven parts hydrated lime and apply at the rate of fifteen to twenty pounds to the acre. Even better is a dust made of one part magnesium arsenate and five parts hydrated lime. The best spray is one ounce of magnesium arsenate to three gallons of water. Bulletin No. 75 of the agricultural extension service, Ohio State University, Columbus, is the latest publication dealing with the beetle.

* * * *

If your iris planting is finished, it's time to begin thinking about peonies. You won't plant these until after September 15, but August is the time to send for the new catalogs, to figure out orders and send them in. The early orders are the ones that get first pick of the available supply.

HAVE YOU PLANTED IRIS?
If you have, it is time to think about peonies, and make your plans

* * * *

August is also the month to think about evergreen plantings. The fall planting season for these begins about the first of September and continues until November. Early planting will give the evergreens a better chance to get settled in their new location. Here again, get the catalogs, make up your list of needs and send in your order in plenty of time. Also get the ground ready ahead of time.

* * * *

The hot days of late summer either make or ruin the perennials in the seed frame. Give them a thorough watering once a week, by pouring, not by sprinkling. Keep the weeds out. If the ground cakes, the sharp point of an ice pick comes in handy as a cultivating tool to break up the surface where the seedlings are too close to permit use of a larger tool. If necessary, use a lath shade over the more tender kinds during the heat of the day, to keep them from being scorched.

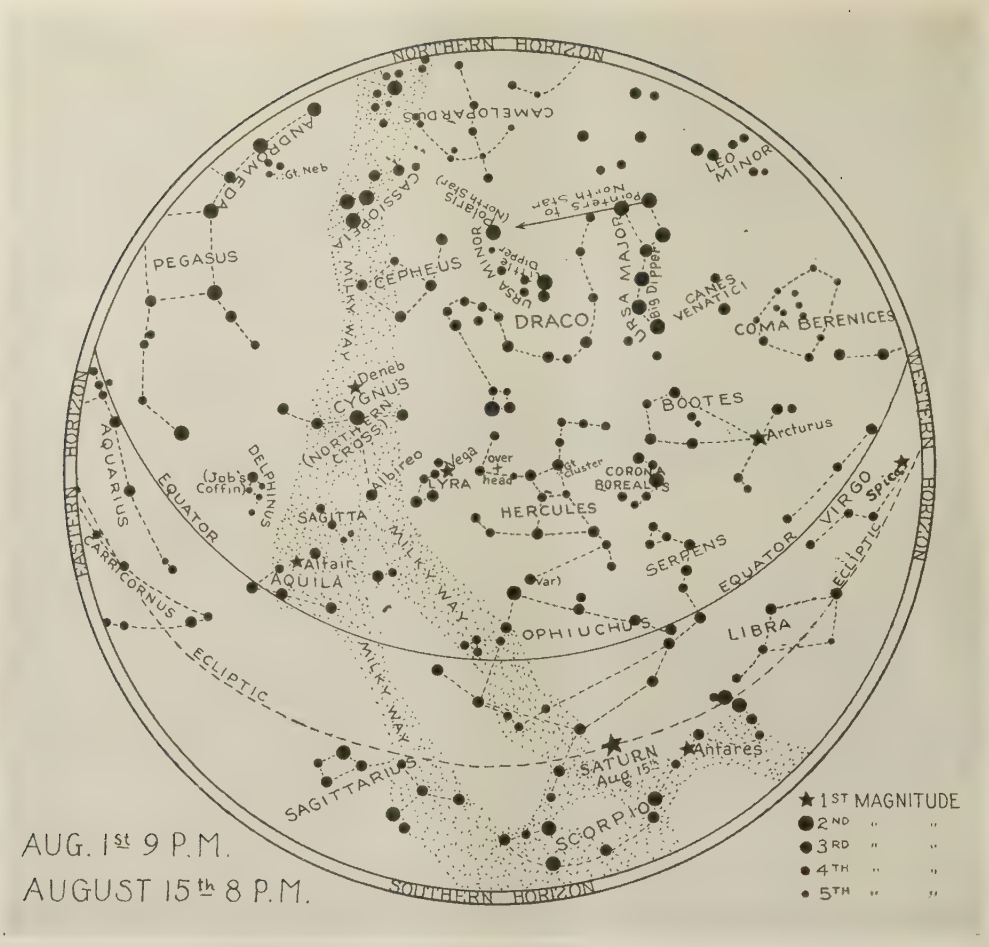
* * * *

There is still time to sow seeds of some of the more rapid growing perennials as coreopsis, gaillardias, sweet williams, shasta daisies and hollyhocks. One can also sow freshly gathered seed of delphinium and a good many other sorts. It is a good time to sow myositis or forget-me-nots and bellis perennis for spring bloom.

* * * *

The secret of getting germination of perennial seeds in hot weather is to lay burlap on the ground after the seed is sown and sprinkle on top of this, then keep sprinkling often enough to keep the ground moist but not wet. Remove the burlap as soon as the first signs of green shoots appear. Keep the frames shaded with lath or muslin. Do not transplant these late-sown perennials until the next spring for best results.

PHLOX BLOOMS THIS MONTH
Cut away the old blooms, however, as it should not be allowed to go to seed



TO USE, HOLD OVER HEAD WITH TOP TOWARD THE NORTH

VENUS AND MARS

Our Two Nearest Neighbors, And How They Look

By Isabel M. Lewis

THE TWO planets, Venus and Mars, which come nearer to the earth than any other celestial bodies with the exception of the moon, a few asteroids, and occasional comets and meteors, more closely resemble our own planet in many respects than any other bodies in the solar system.

In size both of these planets are smaller than the earth. The diameter of Mars is only four thousand two hundred miles, not much more than half that of the earth, and its surface area is less than one-third that of our own planet. Gravity at its surface is so low that a boy weighing one hundred pounds on the earth would weigh only thirty-eight pounds on Mars. Venus, however, so closely resembles the earth in size, density, and surface gravity that it is often spoken of as the earth's twin or sister planet. The diameter of the earth is 7927 miles; that of Venus is about seven thousand six hundred miles. So the two planets differ very little in surface area. So small is the difference in surface gravity on the two worlds that a boy one hundred pounds in weight would be only fifteen pounds lighter on Venus.

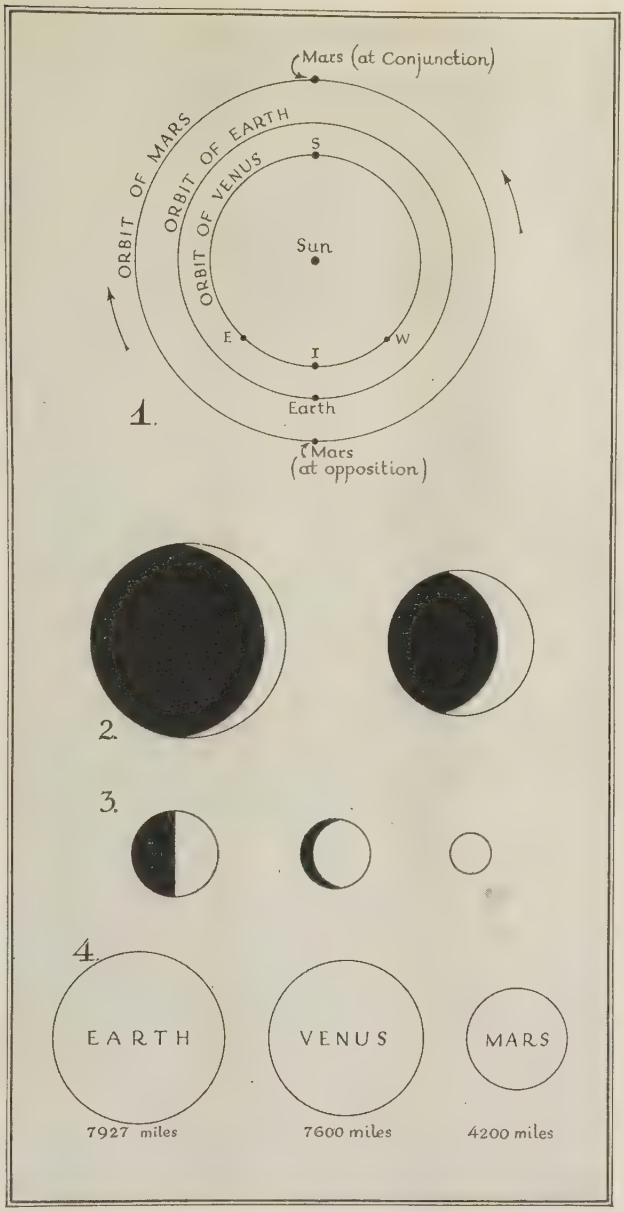
Next to the moon Mars is more favorably placed for our observation than any other body in the solar system. Venus, on the other hand, in spite of the fact that it comes within twenty-six million miles of the earth, as compared to thirty-four million six hundred thousand miles for Mars under the most favorable circumstances, is one of the most disappointing of all the planets to observe telescopically. A study of the diagram which shows the relative positions of the three planets in their orbits will make it clear why we are always at a disadvantage in observing Venus. When the planet is nearest to us, at inferior conjunction, as it is called, it lies between us and the sun and its dark or night side is turned toward us. Because the orbit of the planet lies inside of that of the earth we see it illuminated differently by the sun in different parts of its orbit.

In other words, Venus has phases similar to those of the moon. When the planet is nearest the earth at inferior conjunction its phase is that of the new moon. At superior conjunction when on the far side of its orbit from the earth it is again in line with the earth and sun and so is again invisible although its phase is now that of the full moon. The distance of the planet from the earth at inferior conjunction is twenty-six million miles but at superior conjunction it is one hundred and sixty million miles. The enormous difference in the distance of the planet from us in the two positions makes a very great difference in the apparent size of the planet in the telescope. Yet so brilliant is this planet that even when in the farthest part of its orbit from the earth it far outshines any other planet in the solar system as well as the brightest of the stars. Mars at its most favorable opposition approaches nearest to its brightness, though always far inferior to it, but otherwise Jupiter is its closest rival in brilliancy. Venus has its greatest brilliancy thirty-six days before and after inferior conjunction. At this time, viewed through the telescope, it has the crescent phase and resembles the moon when it is five days old. About seventy-two days before and after inferior conjunction Venus is at eastern elongation, when it is to the east of the sun and visible in the evening sky, and western, when west of the sun and visible in the east before sunrise. It then has the phase of the half-moon in the telescope and is at its greatest angular distance east or west of the sun, which amounts to about 48 degrees. It sets more than three and one-half hours after the sun if it is at eastern elongation or rises more than three and one-half hours before the sun if it is at western elongation.

It takes Venus two hundred and twenty days to pass from western elongation to superior conjunction. During this time it is decreasing in telescopic size because it is receding from the earth. Its phase is gibbous like that of the moon between first quarter and full and it is visible in the east before sunrise. As it approaches superior conjunction it draws in toward the sun and is finally lost to view in its rays. After superior conjunction Venus appears decreasingly gibbous once more in the telescope for two hundred and twenty days and its phases are those of the moon between full and last quarter. It is then increasing in size in the telescope because it is again approaching the earth. It is visible in the west after sunset and its angular distance from the sun steadily increases until it reaches eastern elongation when it again has the phase of the half-moon. After this its distance from the sun again decreases and it has the crescent phase, the disk of the planet increasing greatly in size and the crescent becoming thinner until it disappears from view in the rays of the sun again near the time of inferior conjunction.

In addition to being handicapped in our observations of Venus by its unfavorable position inside the earth's orbit we are at a still greater disadvantage from the fact that Venus has a dense atmosphere which so completely conceals its surface that no clearly defined markings can be seen. As the time of rotation of a planet on its axis, or the length of its day, is determined from observations of such markings it has so far been impossible to settle the question of the period of the planet's rotation on its axis. Some interesting observations of faint markings on the planet in ultra-violet light made last year by Dr. F. E. Ross at the Mt. Wilson Observatory seem to show that the length of the day on Venus, though greater than our own day, is very much shorter than the planet's year. This seems to upset the old theory that the planet always keeps the same face turned toward the sun and favors the theory of the existence of life on this planet. Indeed, the general belief now seems to be that life on both Venue and Mars is not only possible but also probable.

(Continued on page 134)



OUR NEIGHBORS AS WE SEE THEM

Figure one shows the positions of Mars and Venus with respect to Earth, the initials I, S, W, and E referring to Venus' inferior and superior conjunctions and eastern and western elongations. Figures two and three show the relative phases of Venus, while at the bottom are the relative sizes of the three planets

DEPARTMENT *of* NATURE EDUCATION

Dr. E. Laurence Palmer
Cornell University, Director

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Three Types of Nature Educators

by E. Laurence Palmer

PRELIMINARY to closing up shop for the school year, I have been browsing back through my files of interesting articles by workers in the field of Nature Education in its broadest sense. I have been trying to get in mind the nature and type of contribution made by these people. It would seem that there are at least three types of workers who are making worthwhile contributions. There are others who may be making more noise about what they are doing but this article is not concerned with them. It is provable accomplishment that really counts.

Just as it is difficult to know where a circle begins, so it is difficult to know which type I have in mind should first be considered. The three types may be well represented by three papers which for one reason or another come to my mind. These papers are not startlingly new. In fact, one was first printed in 1924, while the other two appeared about a year later.

One of the papers is "Five Days and an Education" by Dallas Lore Sharp. I believe that it appeared originally in the August, 1925, *Harper's Magazine.* A certain graduate student commenting on the paper felt sorry for Sharp that he had had no more than five days of real education. Said the student, "Why I can think of any number of days in which I have had experiences as marvelous to me as were those described by Sharp". Anyone who has read Sharp carefully will realize that his education has not been limited to five days. Sharp is willing to admit, however, that there have been five days in his education which stand out above all others and the five days are these:—

There was the day of investment when he bought his first book. This was followed by the day of adventure when he discovered that books might lead to adventures which he himself might make real. The third, was a day of wonder when he began to appreciate the rewards of education as shown by his experience with a Brown University naturalist. The fourth, was a day of power when he learned to tell of something about which he really knew, and the fifth, a day of weakness when he realized that there are things which cannot be labeled and classified. In his attempt to accentuate the value of what he thinks "real" in education he says, "Teaching is not the science the schools of pedagogy would reduce it to. It is more art than science—a living teacher instead of a trained machine".

Sharp is both right and wrong in his generalizations. We need Nature leaders who look upon their work as an art, but we also need those who understand the mechanics of making that art successful. There are many people well endowed with ideals but lacking the technique for making those ideals real or appreciated by others. Many of these "feel themselves called" to "go into Nature work", and right here let me say that those who do not feel this way should not go into it.

The second article which I have in mind is "The Construction of Measuring Instruments in the Field of Education". It was written by Dr. S. A. Courtis and appeared in *The Scientific Monthly* for September, 1925. The article holds little of the popular appeal of Sharp's. In fact, to many, it is repelling. But if one reads it fairly he cannot help but realize the serious painstaking way in which at least some engaged in research in education are taking up the tasks of finding out what changes we are producing by our educational practices. We need workers of this type who are specialists and in addition we need something evolved whereby the useful techniques developed by these workers may be put into more effective and general practice. There are indications that much will be done in the near future to assist in building our Nature programs in accord with an educational philosophy of proven worth.

The third type of individual I have in mind is the one who will combine the Sharp and Courtis ideas. Possibly few articles have better pictured this type of

(Continued on page 136)

Cornell University, on behalf of the New York State College of Agriculture announces the foundation of the Charles Lathrop Pack Fellowships in Nature Education and Forestry. The investigations under these fellowships shall deal with problems of Nature Education and Forestry with the object of determining methods and practices affecting the education of the public in the use of its natural resources. The fellowships presuppose a Master's degree or its equivalent. Information can be obtained from E. L. Palmer, Fernow Hall, Ithaca, New York.

What Would YOU Do?

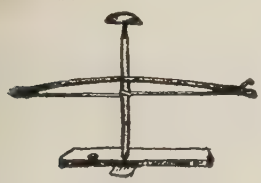
LOST IN THE WILDS -- NO FOOD -- A RISING FEVER --

For Food

No one acquainted with Ernest Thompson Seton ever starves to death in the wilds. He tells you about dozens of emergency foods—roots, berries, mushrooms, lichen growths, etc., etc.

For Medicine

The woods are a regular drugstore for those who know the medicinal value of the various leaves, barks and roots. One of the forest remedies which Ernest Thompson Seton suggests for a cold or fever is the flowering dogwood. He tells you how to identify the remedies he recommends.

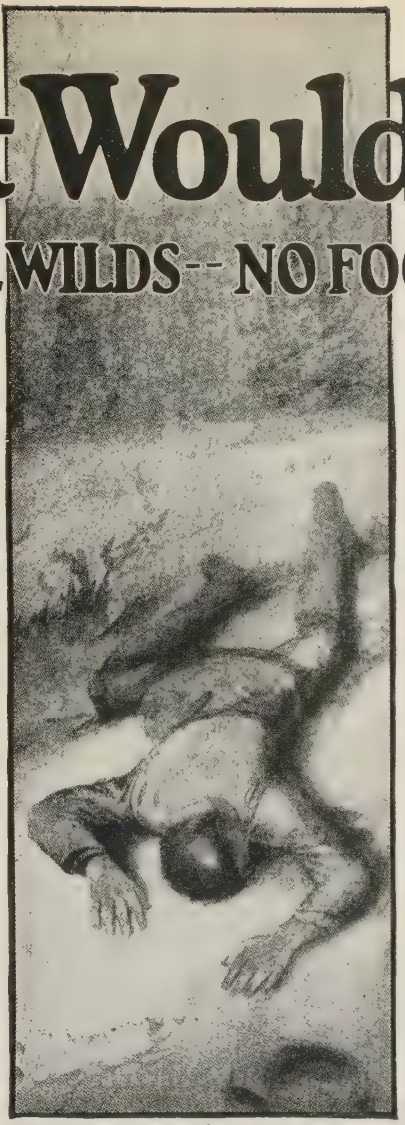


For a Fire

If your matches get wet and you are cold it is well to know the several ways of starting a fire *without* matches. Above is a drawing by Seton which shows the use of drill, block, tinder, bow and socket, all made from materials you will find in the woods.

I am lost. Help!

If you should break a leg in the wilds, if you were sick and were becoming worse every moment, you should use the S. O. S. of the forest—two fires about fifty feet apart which will send up two columns of smoke. Other means of bringing aid from considerable distance are also suggested by Mr. Seton.



The Library of Pioneering and Woodcraft will tell you what you should do and entertain you too!

IF your strength was failing—your head full of tortured thoughts of starvation—your throat parched for water—what would you do? A seasoned woodsman would not get in such a position. He would know how to avoid it. Even in strange country, he would know how to locate water, how to keep his bearings, what roots, berries and other wild foods would sustain him in time of need. But do *you* know how to avoid it? Do you know how to "carry on" if it *does* ever happen to you? Food is at your feet if you can but recognize it. Medicine is on a nearby bush but you must know which one. Help will come if you know how to signal for it.

Prepare *now* for this emergency. Prepare now to *avoid* any of the hardships of the wilds. Prepare to enjoy your outing or hunting trip *as you never have enjoyed one before!* Learn every secret of nature from Ernest Thompson Seton's *Library of Pioneering and Woodcraft.*

No other man knows animals, plants, Indians and pioneer life as he does. No one else can tell you about it all so entertainingly. You can virtually sit at this master woodsman's camp-fire and listen to him talk as you read these six wonderful volumes on life in the open. Here is every feature of outdoor life, from preparing your outfit to trailing animals and first aid.

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NATURE NEWS AND Views

Edward Forbush Retires

A fitting tribute was recently paid to Edward Howe Forbush, since 1908 ornithologist of the State of Massachusetts and long recognized as a peer in his profession, when a distinguished group of friends held a dinner in his honor in Boston to celebrate both his retirement and his seventieth birthday. Mr. Forbush still plans to continue his writing and research, however. Mr. Forbush has already received a gold medal "for outstanding achievement" from the state he served twenty years, and recently the Boston Society printed a special number of its proceedings entitled "Edward Howe Forbush, A Biographical Sketch", by John B. May.

Vanishing Birds

One by one the birds are losing their fight for life, and already most of the birds whose ancestors saw the dawn of human development have become extinct, Dr. Alexander Wetmore of the Smithsonian Institution told the Washington Academy of Sciences recently. The best days for birds were those preceding the Great Ice Age, but the cold winters and stormy summers of later periods were hard on them. Then man appeared, to take his toll. He pointed out that perhaps birds would go the way of the pterodactyls, and the air would be clear for airplanes and insects.

Save Your Seeds

In connection with the American Nature Association's request for individuals to save their seeds, so that birds may enjoy them, an Ohio correspondent writes: "I happened to save the seeds of an extra fine watermelon, and placed them in a window box to dry. Presently a bright object just two feet away startled me—it was a red bird, or cardinal grosbeak, devouring the seeds. Another came and more, and in less than two days all the seeds were gone. No birds came until other seeds were spread for them, but less than half an hour after another feast was prepared, the birds were again at work".

Birds Change Ranges

The fact that the ranges of certain birds change with time is well known, but a new observation of such an event comes from Joseph H. Harvey of Talladega, Alabama, who writes: "While I was living in Stark County, Illinois, from 1876 to 1895, I never observed either cardinals or mocking birds. During a 1927 visit, however, both species were found, and I learned from other observers that the cardinal had reached there eight years earlier". Such extensions of the ranges of birds are continually going on, and definite records of this kind are decidedly valuable.

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CHARLES LATHROP PACK, *President*
American Tree Association
Washington, D. C.

Oregon Refuge Established

A 5,200 acre wild game refuge embracing parts of the Klamath River Valley and upper lake near Crater National Forest, Oregon, has been established by executive order of President Coolidge. This area, consisting mainly of marshland, affords abundant cover for the nesting wild fowl of the region, and will replace to some extent the Lower Klamath Lake, the draining of which took away from migratory birds along the important Pacific route, a principal resting place. All wild game within the area is protected.

Lost Provinces

An attempt to recover the "lost provinces of forestry", some seven million acres of cut-over, burned-over and waste forest lands in Wisconsin, is to be made by the Federal and local officials, L. F. Kneipp, assistant forester of the Forest Service reports. This area is but a part of the eighty-one million acres of the United States, but now lying unproductive, which conservationists hope eventually to make profitable. It lies "in relative proximity to what eventually will be probably the greatest timber consuming center of the Nation". Some nine hundred thousand acres may be secured under the McNary-Clarke law, and private, county and State agencies will seek to develop other sections.

New York Nature

Among the New York facilities for Nature education of citified folk is the Brooklyn Botanic Garden, which instructed more than a million people last year. Its directorate seek to help children more than adults, and maintain child classes, gardens and club rooms, but adults flock to it in great numbers. Nearly twenty-six thousand people attended lectures in 1927, and more than five thousand were registered in regular courses.

Preparing for Fires

With the memory still fresh in mind of the average annual total of 4,777 forest fires, and accompanying destruction of one hundred and forty thousand acres of forest land, the Northeastern Forest Experiment Station in cooperation with the Weather Bureau and the state departments has begun its annual war on the "red menace". Weather forecasting is the new weapon being employed, and four stations have been built to study fire weather conditions, and to predict periods of drought, when foresters shall spread their cordon of rangers. Spring and fall are considered the most dangerous times, but carelessness can make any period one of forest destruction.

Can Birds Communicate?

The question of bird communication is again brought up by H. H. Groves, of Wisconsin, who reports an unusual incident of bird migration. A flock of geese were flying southward over Wisconsin wilds, in regular formation. Suddenly the rear guard pushed to the front, and flew a second or so beside the leader, who almost immediately turned the flock at right angles toward the west. The guard returned to his place, and the flock passed from view. There was a lake westward,—straight on there was only dry land. Had the goose seen the water, and advised the captain of the flock?

A New World

Observers of the heavens in South Africa sat at their telescopes during March and saw re-enacted before their eyes, as if they were at a play, events similar to those which gave birth to this solar system some billions of years ago. They watched the new star, Nova Pictoris, and another star, hitherto barely visible, pass close to each other, burst forth with great display of heat and light, and partly disrupt. Such were the birth throes of this world, scientists believe, and perhaps even now Nova Pictoris and the other star are each starting on a new course of evolution which in time will bring forth new planets, and mayhap life. Thus another solar system, to be one of the millions in the heavens.

Nature Study Club

The Nature Study Club of Indiana, which was started with 57 members by William Watson Woollen, a nature writer on the *Indianapolis News*, in 1908, has grown to an enrollment of more than four hundred, according to its secretary, Miss Mary A. Hunt. Besides studying Nature at first hand, the organization has been active in supporting conservation projects in the Hoosier State.

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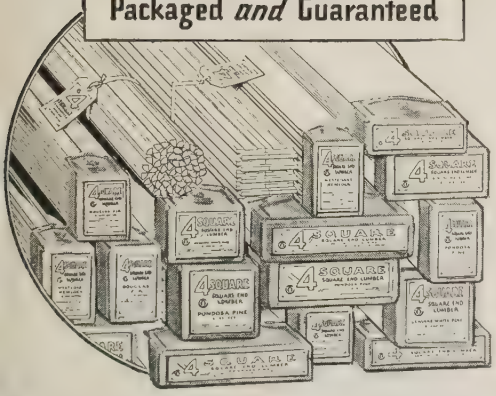

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Common Wild Flowers

If you cannot go into the woods and name to your visiting friends the common blossoms blooming there, then Ernest M. Gress' latest book, *Common Wild Flowers,* should be added to your library. It packs in small space information on more than four hundred common flowers all found in Pennsylvania, tells the legends and stories associated with them, gives their insect relationships and in many cases illustrates them. The book, written as it is by a teacher who is now State Botanist of Pennsylvania, has a simple style designed for children, but serves admirably those adults who are still in their Nature infancy. It is published by the Times Tribune Company of Altoona, Pa., at $.75 the copy, two copies for $1.25, or at the rate of $.60 each for ten or more copies.

Insect Stories

For the child Nature student, few books have been written. All the more welcome therefore, is *Insect Stories,* by Charles Lincoln Edwards, who is director of Nature study in the Los Angeles City Schools. Written most simply, printed in large type and with clear illustrations, this pamphlet discusses the elements of entomology without ever using a word that big. Valuable, we believe, as an aid to the teacher.

Three Field Books

From the press of George P. Putnam's Sons have come three books which the amateur Nature lover has long been awaiting. They are field books—small, compact enough for pocket or for pack, printed on good stout paper that will stand rain (in moderation) and dirty fingers. They are not designed for the library—they were made to go with one, on his trips. *The Field Book of North American Mammals,* compiled by H. E. Anthony and priced at $3.50, is complete in its survey of land and marine mammals, and concise and simple in treatment. William S. Thomas' *Field Book of Common Gilled Mushrooms,* also $3.50, was written for the epicure who doesn't want to get poisoned—it charts exhaustively the edible and non-edible varieties, and has excellent cooking recipes. *The Field Book of Common Ferns,* by Herbert Durand, lists fifty species, and contains general information without which a fern student would be lost. These books are encyclopedias, but their beauty lies in this,—they can be carried in three pockets.

Fur Farming for Profit

This book which appears as one of the Rural Science Series published by Macmillan, is written by Frank G. Ashbrook, whose position as Chief of the Division of Fur Resources of the Biological Survey, United States Department of Agriculture, has afforded an unequalled opportunity for

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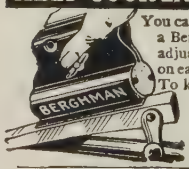

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a study of the business of raising animals for their fur.

A short general history of fur-farming is given. Foxes, since their culture has met a greater amount of success than any other species, are properly treated in some detail. We note with satisfaction that the author holds conservative views, and is careful to point out the difficulties as well as the advantages. The raising of muskrats, except under natural conditions, is not encouraged. It is pointed out that in the case of the moderate priced furs, the cost of the food necessary to raise an animal is prohibitive; opossums, skunks and raccoons are specifically included in this class. The practicability of raising martens, fishers and otters is questioned, owing to their indisposition to breed under restraint. The mink breeds more readily, but success in its culture is not assured, nor is that of the beaver, though the latter is promising. The very practical subjects of pelting, marketing and hygiene are fully discussed.

The book is by far the best of such manuals, and no one should embark in fur-farming as a business without reading it. To all fur raisers, practical or prospective, it is well worth the price of $4.00 charged for it by the publishers.

Colorado Life

As greatly varied as is the flora and fauna of Colorado, two Professors of the University of that state, Francis Ramaley, biologist, and Theodore D. A. Cockerell, zoölogist, have succeeded in compressing in two neat volumes the results of exhaustive research covering nearly every class of life found there. These books, whose titles are *Colorado Plant Life* and *Zoölogy of Colorado*, are published by the University at Boulder, price $2.

Your Police Dog

Few sights are more tragic to the dog-lover than a police dog that is not trained, and whose intelligent face and quick, perceptive mien shows nothing. Few owners, however, know how to go about training their dogs, and it is to supply this lack that Fred Kollet, dog trainer for twenty five years, writes *Training the Police Dog*, published by Judy Publishing Company. The author first discusses the psychologic ideas underlying training, then in detail outlines procedure to turn a mere canine into a clever, interesting pet.

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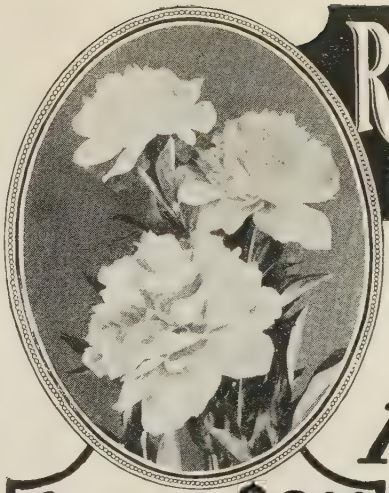

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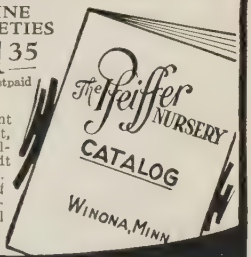

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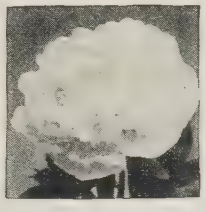

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Dates for the coming season should be arranged as soon as possible by addressing

EXTENSION DEPARTMENT
AMERICAN NATURE ASSOCIATION
15 Boudinot Street, Princeton, New Jersey

Venus and Mars

(Continued from page 127)

Both of these planets are known to have atmosphere and an atmosphere is the first essential to the existence of life. It is the absence of an atmosphere on the moon that discourages any belief in its habitability. Both air and water are lacking on the moon. It is practically certain, however, that they are present in sufficient quantities to support life on both Mars and Venus.

Long series of observations of Mars have proven beyond any question that the planet has an atmosphere of considerable density, though much rarer than that of the earth, also that oxygen and water vapor are present in its atmosphere and that seasonal changes take place on the planet's surface that cannot be reasonably explained on any other assumption than that vegetational growth and decay take place there as on earth with the changing seasons. Among the most important observations of this planet made in recent years have been those made at Lowell and Mt. Wilson Observatories of the heat radiations from the surface of Mars. These agree in showing that the temperatures of the surface of Mars rises as high as 60 degrees Fahr. or more at Martian noon at the equator and also at certain periods in polar regions although at night the fall in temperature must be very great due to the rareness of the planet's atmosphere. Although the temperature of the planet must be one of great extremes even at the equator the fact that it rises well above the freezing points for considerable periods of time makes practically certain the development of certain forms of life on Mars, though these forms of life must be very different from what they are on earth, because of the thinness of the planet's atmosphere, its very low surface gravity and temperature and the scarcity of water.

Venus, because of its dense atmosphere and much higher temperature, due to its nearness to the sun, may be a world where tropical vegetation abounds. But we can do little more than speculate regarding the nature of the surface of this planet since it is masked almost completely and continuously by its seemingly impenetrable canopy of clouds. Whether a way will be found to penetrate this veil of clouds is an interesting question.

There are few clear nights in the month of August when meteors will not be seen in greater or less numbers for the Perseids which return annually in August are a swarm of considerable numbers well distributed along their path. The greatest display may be expected, however, around the middle of the month during the midnight hours when their radiant in the constellation of Perseus is well above the horizon. These meteors are yellowish in color and move with moderate velocity as distinguished from the Andromedes, the November meteors, which are slow-moving and reddish, and the Leonids which also appear in the month of November in the early morning hours and are bluish or green and very swiftly moving. All of these meteors are mere dust-like particles, the debris of comets that have become more or less disintegrated, and they are heated to incandescence and consumed entirely by friction when they are swept up by the earth's atmosphere.

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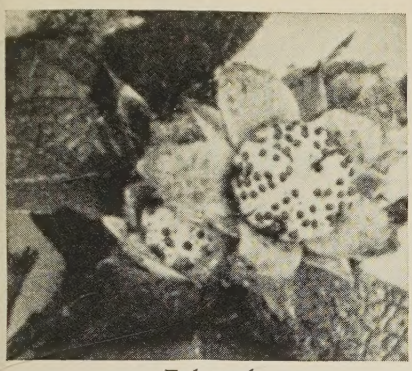

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Boston

The southern evening sky is particularly beautiful in August because the two brilliant zodiacal constellations, Scorpio and Sagittarius, are now well in view in that part of the heavens. Saturn also will be found in the south at this time of the evening in Scorpio, west of the meridian and a few degrees northeast of Antares. This is the only planet visible at this time. Venus, which was in superior conjunction with the sun last month, is now coming into view low in the western sky in the evening twilight but it is still very close to the sun and will not be seen to advantage this month. It will not be long, however, before it will once more be a beautiful evening star.

Jupiter and Mars now rise around midnight. Jupiter is in Aries this month and will rise before midnight, Mars somewhat later in Taurus. On the fifteenth Mars will be found about midway between the Hyades and Pleiades. It resembles Aldebaran in the Hyades in color for both star and planet are reddish, but Mars is now decidedly brighter than Aldebaran and is steadily increasing in brightness. It is due at opposition in December. Since the orbit of Mars is decidedly elliptical in shape, more so than that of any other planet with the exception of Mercury, its distance from the earth varies greatly at different oppositions. At the coming opposition, which is not a very favorable one, the planet will be over fifty-four million miles from the earth, as compared with thirty-four million six hundred thousand miles at the very close opposition of 1924.

Constellations that are now particularly favorable for study in the evening sky, in addition to Scorpio and Sagittarius in the south, include Boötes and Corona Borealis in the west, Hercules and Lyra nearly overhead, and Cygnus high in the eastern sky. Aquila will be found south of Cygnus. The Big Dipper is well in view in the northwest and Cassiopeia and Cepheus in the northeast while the head of Draco is now on the meridian due north beneath the foot of Hercules. Note also on clear, dark nights the great beauty of the Milky Way which arches high across the eastern sky at this time of year.

Against Pole-Traps

Legislators in New Jersey are making attempts to abolish the pole-trap under the leadership of Frank D. Abell, Senator, and in conjunction with the efforts of the New Jersey Audubon Society. The Society, in reporting recent investigations into the use and results of these traps, asserts that they are cruel and non-discriminatory, catching numbers of harmless, beneficial birds while only a few of the predatory creatures are destroyed. Although hawks and owls are the creatures most sought as destructive, the society reports that even the so-called "henhawk" feasts most largely on rodents and creatures harmful to the farmer, while the principal diet of the owl proves to be mice.

Sugar Cane Hunt

An airplane search for disease-resistant sugar cane varieties to replace the less hardy types used commercially in Louisiana and other southern states is now being made in New Guinea by Dr. E. W. Brandes, under the auspices of the United States Department of Agriculture. If this flight is successful the expedition will considerably help disease-burdened southern cane indus-

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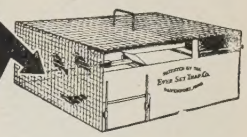

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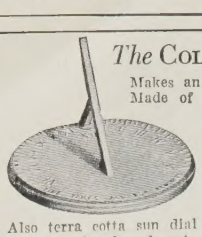

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KEN-L-RATION
THE DOG FOOD SUPREME

DEPARTMENT of NATURE EDUCATION

(Continued from page 128)

worker than "The Fifth Estate" by Arthur D. Little. This article has been printed by The Chemical Foundation of New York City. Little's article is an appeal for the type of individual interested in science education who, like Benjamin Franklin, was scientific and at the same time human and sympathetic, —the type of individual who can command respect in more than one field of human accomplishment. He points out, as did Wiggam in "The New Decalogue of Science", the need of individuals who can apply the methods of science to everyday affairs.

As this article is being written the major political parties are preparing to meet to select candidates to hold vitally important and influential positions in society. By the time it appears in print, the choices will have been made. The voters will then be asked to make a further choice. Through most of the process, political jockeying, intrigue, bombast, harangue and strategy will play very important parts. The victors will not of necessity be those best fitted for the honors bestowed upon them. We haven't yet developed a population that is willing to make some effort to determine the important facts necessary for them to make able decisions and insight also helpful in making those decisions which cannot be reached by adding machine methods.

All three of the writers suggested in this article are agreed that teaching, in school or out is the most important business. Because of its importance those engaged in it should not be satisfied with practices which merely enable them to "get by".

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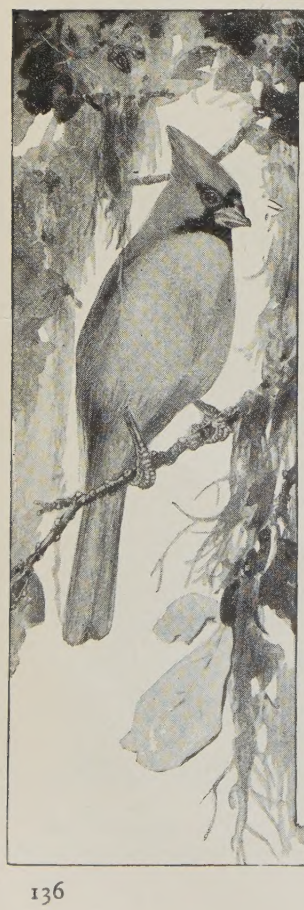

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A Bright Future For Forestry

Passage of McSweeney Research Bill Begins New Era in History of the Subject

The year 1928 marks the beginning of a new era in forestry history because the Congress has opened the door to forest research. This means the placing of this great problem, whose ramifications lead into every industry, upon an exact scientific basis.

Passage of the McSweeney-McNary Bill and its signing by President Coolidge opens this door to new fields and thus marks the date forest research begins to take its place beside the research programs long carried on by other great industries.

The stock market has furnished numerous demonstrations of the commercial worth of scientific and technical research in chemistry, mechanics and engineering. The United States has virtually succeeded to the rôle once conceded to Germany in the study and exploitation of industrial discoveries. To mention only a few examples of the advancement of science and inventive research that are reflected in the course of the stock market during the upward climb of securities in the last few years is sufficient.

Notable among corporations which are pioneering in the scientific field is du Pont, whose success is a matter of common knowledge. Commercial Solvents represents an enterprise that owes its origin wholly to the discoveries of chemists engaged in commercial and industrial research. The Packard Motor Car Company has come to the front as a builder of heavy duty airplane motors because of experiments continuously carried on by Packard engineers over a long period of time.

Leaders in the combustion engineering field are doing things to-day which give promise of far reaching betterments in the use of gas and coal. What the electrical machinery builders have been doing for a generation in their branch of industry is being achieved to-day in numerous other divisions of industry.

Then why not more forestry research? The foresters need it to be able to answer the questions asked every day by forward looking lumbermen and forest owners. It is this door that is opened by the McSweeney Research Bill. Likewise the forestry soil research started at Cornell by Dr. Lars G. Rommel who now occupies the Charles Lathrop Pack chair of Forest soil science is an example of what is being done.

What the Adams and Hatch laws meant to the establishment of the agricultural experiment stations, the McSweeney law means to forest experiment stations. It is the organic act creating forest experiment stations and providing in an orderly manner for their maintenance and development.

There is one important difference between the two organic acts. The agricultural organic act provided an agricultural experiment station for every State in the Union, irrespective of its size, the Federal Government extending equal aid toward the support of each station. As a result, agricultural experiment stations cover to a large extent practically the same field, with some inevitable duplication. States important agriculturally receive only as much Federal support as small States in which agriculture is of comparatively small importance.

The forest organic act reverses the procedure, foresters point out. The forest experiment stations are regional stations, covering several States similar as far as vegetation and economic problems are concerned. The main support comes from the Federal Government with such assistance as the individual States may provide. The appropriations are not distributed equally but according to the needs of each region. An important forest region will naturally receive greater support than a region in which the forests are of little economic importance.

Another significant feature of the new organic act is the recognition that forest research is concerned not merely with the growth of trees themselves but with the life of the forest as a whole. It recognizes the importance of insects, diseases, and all of Nature's world in the forests.

Forest experiment stations, through this act, become now a national institution, the foresters claim. It, for the first time, provides opportunity for plan-wise and long-time research in forestry.

FORESTRY GOES AHEAD

Here are some recent constructive steps in forestry history in the United States:

1. *Enactment of Woodruff-McNary Bill.*
2. *The McSweeney law for National Forest Research becomes a fact.*
3. *Saving Franconia Notch and the Flume by State of New Hampshire and the Society for Protection of New Hampshire Forests with the aid of the American Nature Association and private subscription by many people.*
4. *Purchase of the Cook Forest by State of Pennsylvania with aid of private money patriotically subscribed.*
5. *Extension of the work of Charles Lathrop Pack Forestry Trust and establishment of the Demonstration Forest in State of Washington. The forest operated by School of Forestry, University of Washington, now includes nearly twenty million feet of commercial timber and can shortly become economically operated and self-sustaining.*
6. *Wisconsin enacts important Forestry Law which has started to work well.*
7. *States of Minnesota and New York have Forestry Commissions at work making research looking toward the enactment of important new Forestry legislation.*

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